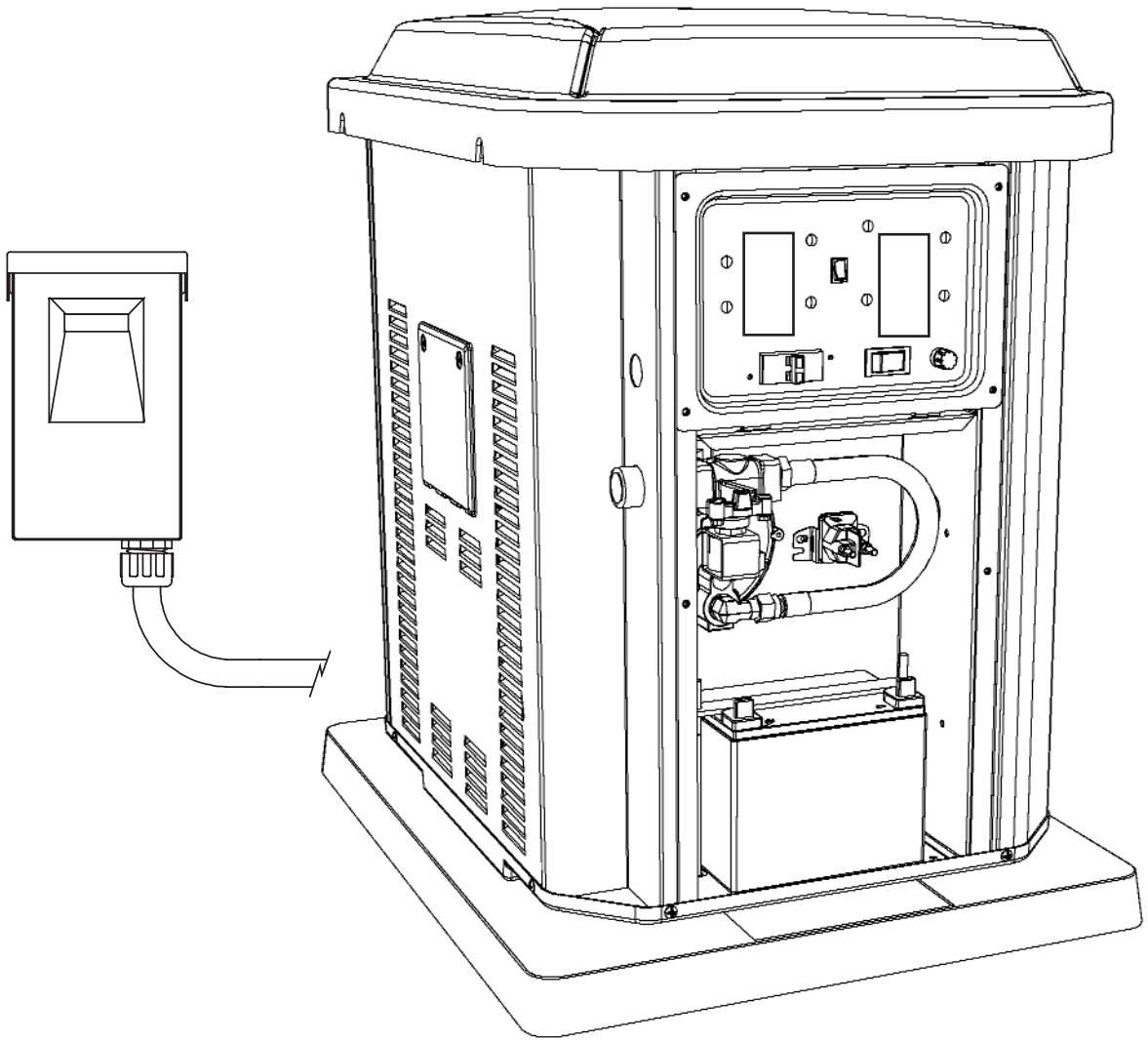
Briggs & Stratton POWER PRODUCTS
Controls by Eaton's Cutler-Hammer

MODELS 1897,1976 & 1977
TROUBLESHOOTING GUIDE



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SAFETY INFORMATION

In the Interest of Safety

This manual outlines the construction, function and servicing procedures of the Briggs & Stratton Power Products® Home Standby Generator System. It is structured for use by trained technicians that are working in a properly equipped shop. Familiarity with the proper method of using tools, measuring equipment and workshop procedures are essential to performing successful maintenance and repair on this equipment.

Ensure that all specified tools and/or equipment are available before attempting to service this equipment.

For a detailed discussion of the fundamental principles involved with the physics of electrical power generation, refer to the "Familiarization and Troubleshooting Guide (Publication **#86262** Revision 3 or later)". This manual is available through your Briggs & Stratton Central Distributor.

Safety Alert Symbols

The safety alert symbol (⚠) is used to identify safety information about hazards that can result in personal injury. A signal word (**DANGER**, **WARNING**, **CAUTION**) is used with the alert symbol to indicate the potential severity of injury. In addition, a hazard symbol may be used to represent the type of hazard.

⚠ **DANGER:** Indicates a hazard which, if not avoided **will result in death or serious injury**.

⚠ **WARNING:** Indicates a hazard which, if not avoided **could result in death or serious injury**.

⚠ **CAUTION:** Indicates a hazard which, if not avoided **might result in death or serious injury**.

CAUTION: When used without the alert symbol, indicates a situation that could result in damage to equipment.

NOTE: This notation is used to inform you of a method, reference or procedure that could assist with specific operations or decisions.

HAZARD SYMBOLS AND MEANINGS

⚠ DANGER

Failure to properly ground generator can result in electrocution, especially if the generator is equipped with a wheel kit.

- National electric code requires generator to be properly grounded to an approved earth ground. Call an electrician for local grounding requirements.

⚠ DANGER

Generator produces powerful voltage.

Failure to isolate generator from power utility can result in death or injury to electric utility workers due to backfeed of electrical energy.

- When using generator for backup power, notify utility company. Use approved transfer equipment to isolate generator from electric utility.
- Use a ground circuit fault interrupter (GFCI) in any damp or highly conductive area, such as metal decking or steel work.
- Do not touch bare wires or receptacles.
- Do not use generator with electrical cords which are worn, frayed, bare or otherwise damaged.

⚠ DANGER

Storage batteries give off explosive hydrogen gas during recharging.

Hydrogen gas stays around battery for a long time after battery has been charged.

Slightest spark will ignite hydrogen and cause explosion.

You can be blinded or severely injured.

Battery electrolyte fluid contains acid and is extremely caustic.

Contact with battery fluid will cause severe chemical burns.

- Do not allow any open flame, spark, heat, or lit cigarette around battery during, and for several minutes after charging.
- Wear protective goggles, rubber apron, and rubber gloves.

WARNING

Fuel and its vapors are extremely flammable and explosive.

Fire or explosion can cause severe burns or death.

GASEOUS FUEL SAFETY

- Only qualified gaseous fuel techinicians should attempt to service the fuel delivery system
- Make sure that propane storage containers are of an approved type and comply with applicable codes, standards and regulations.
- Keep all fuel away from sparks, open flames, pilot lights, heat, and other ignition sources.
- Do not light a cigarette or smoke.

WHEN OPERATING EQUIPMENT

- Make sure a gaseous fuel shut-off valve is available for an emergency.

WHEN TRANSPORTING OR REPAIRING EQUIPMENT

- Make sure the fuel shut-off valve is **OFF**.
- Disconnect spark plug wire.
- Do Not operate generator in a moving vehicle or watercraft.

WHEN STORING FUEL OR EQUIPMENT WITH FUEL IN TANK

- Store away from furnaces, stoves, water heaters, clothes dryer or other appliances that have pilot light or other ignition source because they can ignite fuel vapors.

WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

DANGER

Running engines produce heat. Temperature of muffler and nearby areas can reach or exceed 150°F (65°C).

Severe burns can occur on contact.

- Do not touch hot surfaces.
- Allow equipment to cool before touching.

WARNING

- This generator does not meet U.S. Coast Guard Regulation 33CFR-183 and should not be used on marine applications.
- Failure to use the appropriate U.S. Coast Guard approved generator could result in bodily injury and/or property damage.

Safety Practices

- Do not attempt to modify the unit or use it for any application it was not designed for. If you have any questions about your generator's application, ask your dealer or consult the factory.
- Read these procedures carefully and become familiar with your Home Standby Generator System. Know its applications, its limitations and any hazards involved.
- Never handle any kind of electrical cord or device while standing in water, while barefoot or while hands or feet are wet.
- Do not use worn, bare, frayed or otherwise damaged electrical cord sets with any generator set. Using a defective cord may result in an electrical shock or damage to the test equipment and/or the unit.
- These units require an adequate flow of cooling air for their continued proper operation. Never operate or service any unit while inside any enclosure where the free flow of cooling air into and out of the unit might be obstructed. Without sufficient cooling airflow, the units quickly overheat, damaging the generator and/or nearby property.
- Home Standby Generator Systems produce a very powerful voltage that can cause an extremely dangerous electrical shock. Avoid contact with bare wires, terminals, etc. Never permit an untrained person to service or assist with the procedures discussed in this guide.
- Never start or stop a unit with electrical loads connected to receptacles and with the connected loads turned ON. Start the engine and let it stabilize before connecting any electrical loads. Turn OFF and disconnect all electrical loads before shutting down any generator.
- The manufacturer could not possibly anticipate every circumstance that might involve a hazard. For that reason, warning in manuals, and woarnings on tags or decals affixed to the units are not all-inclusive. Do not handle, operate or service a unit with a procedure or method not specifically recommended by the manufacturer.
- This entire book is filled with important safety information - please read it carefully.

MODELS 1897, 1976 & 1977
TROUBLESHOOTING INFORMATION

SPECIFICATIONS

SPECIFICATIONS: Model 1897, 1976 & 1977

Generator

Rated Maximum Power (LP*)	**7000 kW**
Rated Maximum Load Current:	
at 240 Volts	29.1 Amps
at 120 Volts	58.3 Amps
Rated AC Voltage	120/240 Volts
Rated Frequency	60 Hz at 3600 RPM
Phase	Single Phase
Power Factor	1.0
NG Fuel Supply Pressure	5-7 in. W.C. (127-178mm)
LP Fuel Supply Pressure	11-14 in. W.C. (279-356mm)
Normal Operating Range	-20°F (-28.8°C)-104°F (40°C)
Output Sound Level	81dBa@23ft. (7m) at full load

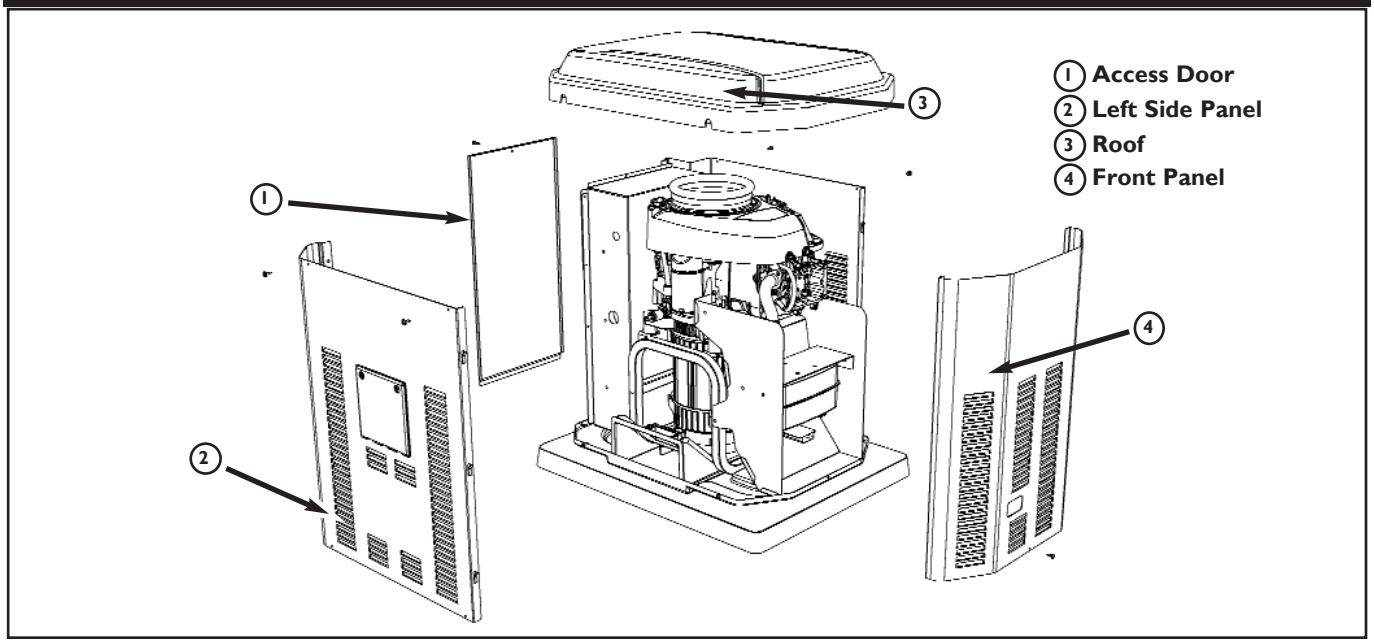
* Natural gas rating will depend on specific fuel but typical derates are between 10% to 20% off the LP gas rating.

Engine

Model	319775
Type	0110E1
Bore x Stroke	3.57 (90.6mm) x 3.06 (77.8mm)
Displacement	30.51 cu. in. 500cc
Spark Plug	BRIGGS & STRATTON # 491055
Spark Plug gap	.030 (0.76mm)
Oil Type	Use only 5W-30 API Service Grade SJ or greater synthetic oil.
Oil Capacity (w/filter)	1.5 qt. - (48 oz.)
Oil Filter	BRIGGS & STRATTON # 492932
Air Filter	BRIGGS & STRATTON # 790217

GENERATOR ENCLOSURE

Figure 1 — Access To The Generator



To Remove Roof:
Remove the four screws and lift off (Figure 1).

To Remove Access Door:

1. Remove roof as described above.
2. Remove screw at top of access door.
3. Pull access door outward (away) from unit while pulling door upward and out of base. Door will come free of generator enclosure.

To Remove Front Panel:

1. Remove lower retaining screw.
2. Lift front panel up and out of retaining clips on right and left side panels.

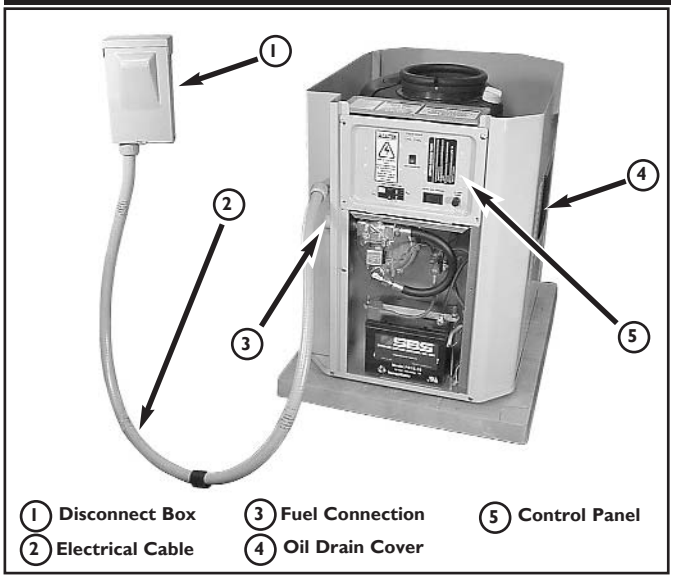
To Remove Left Side Panel:

1. Remove the three screws that retain the panel to the unit base.
2. Remove the three screws that secure the panel to the battery and control panel box.
3. Lift the left side panel from the unit base.

To Install Left And Front Panels

1. Guide left side panel into base and replace screws.
2. Guide front panel into base and retaining clips.
3. Reinstall retaining screws.

Figure 2 — Main Generator Components

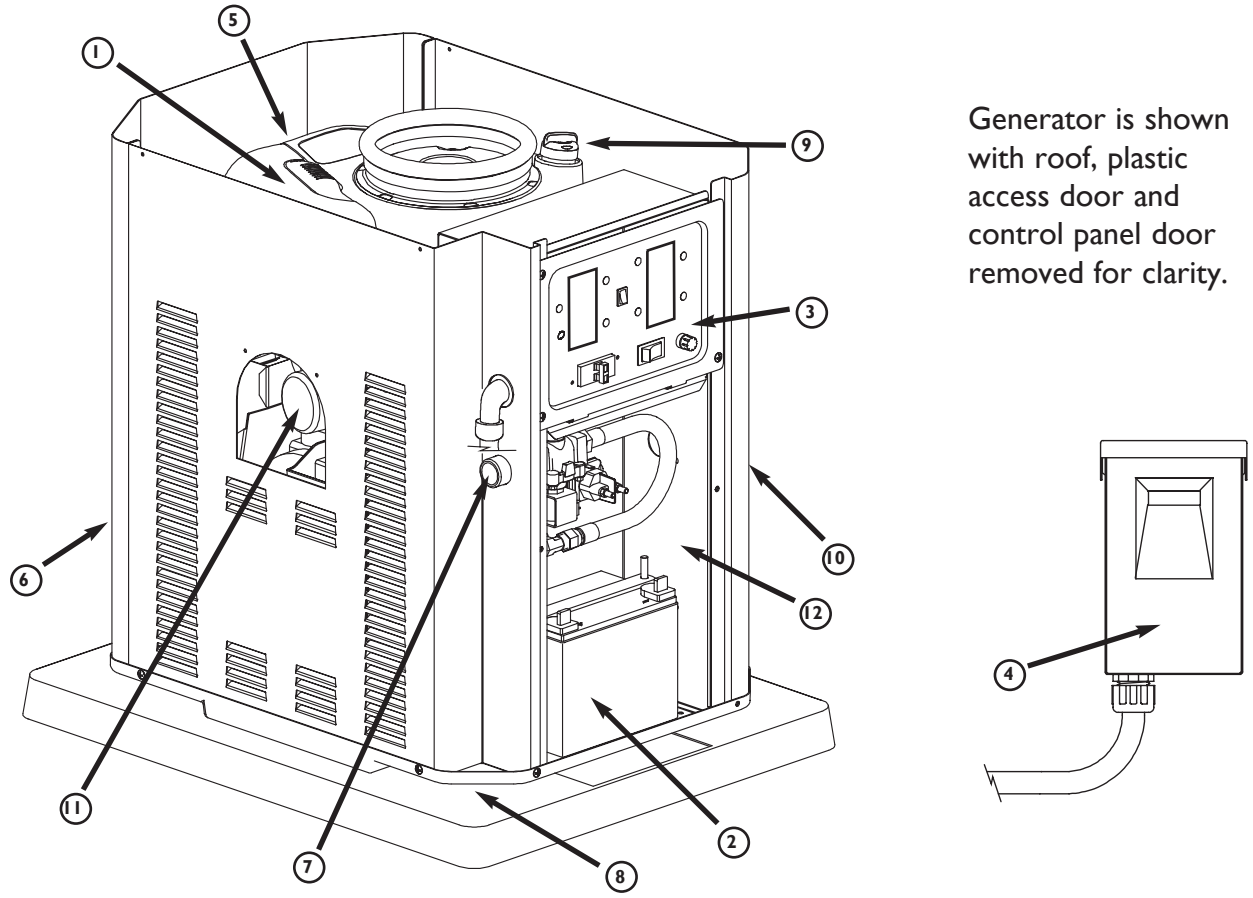


To Install Access Door and Roof:

1. Guide bottom of access door into base.
2. Push access door until it is flush with sides.
3. Replace door screw.
4. Replace roof and screws.

GENERATOR COMPONENTS

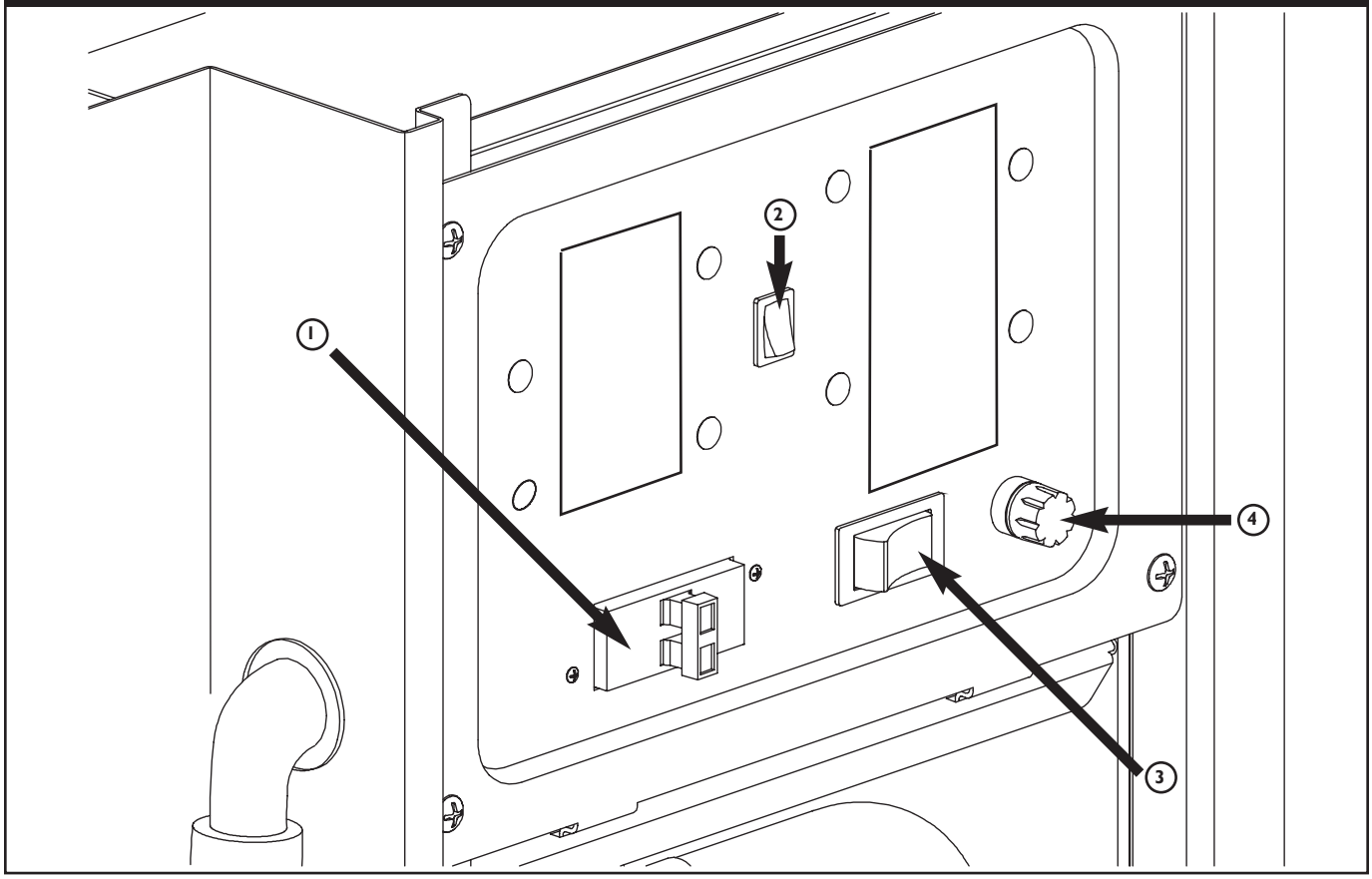
Figure 3 — Generator Components



1. **Air Cleaner** — Uses a dry type filter element and foam precleaner to protect engine by filtering dust and debris out of intake air.
2. **Battery** — 12 VDC, 33 Amp-Hour sealed battery provides power to start the engine. The battery receives float charge to maintain battery when engine is not running.
3. **Control Panel** — Used for various tests, operation and maintenance functions. See "SYSTEM CONTROLS," on the next page.
4. **Disconnect Box** — Convienient junction box for ease of installation. Allows you to connect to generator output and disconnect utility input.
5. **Engine Label** — (Stamped on top of valve cover).
6. **Exhaust Port** — High-performance muffler lowers engine noise to comply with most residential codes.
7. **Fuel Inlet** — Attach appropriate fuel supply to generator here.
8. **Lifting Pocket** — Provided at each corner for lifting generator.
9. **Oil Fill Cap/Dipstick** — Check and fill engine with recommended oil here.
10. **Oil Drain Hose** — Provided to facilitate changing oil.
11. **Oil Filter** — Filters engine oil to prolong engine life.
12. **Unit Data Decal** — Identifies unit by serial number.

SYSTEM CONTROLS

Figure 4 — Know Your Control Panel



① **Circuit Breaker** — Protects the system from over current conditions and must be in the "**ON**" position to supply power to the transfer switch.

② **Set Exercise Switch** — Used to set the exercise cycle start time and day-of-the-week. Exercise cycle only occurs in **AUTO** mode.

③ **AUTO/OFF/MANUAL** — This three position switch is as follows:

- **AUTO** position is the normal operating mode. If a utility power outage is sensed, the generator will start automatically. When utility power is restored, the generator will shut down and is ready for the next utility power outage.
- **OFF** position turns off the generator, prevents generator from starting and resets any faults.
- **MANUAL** position starts the generator. It is used for maintenance or diagnostic functions.

④ **15 AMP Fuse** — Protects the Home Standby Generator System DC control circuits. If the fuse has melted open or was removed, the engine cannot crank or start. Replace the fuse using only a BUSS AGC 15AMP fuse.

FUEL SYSTEM OPTIONS

Reconfiguring The Fuel System

The engine of your Home Standby Generator System is factory calibrated to run on natural gas (NG). With minor modifications it can be converted to run on liquid propane (LP).

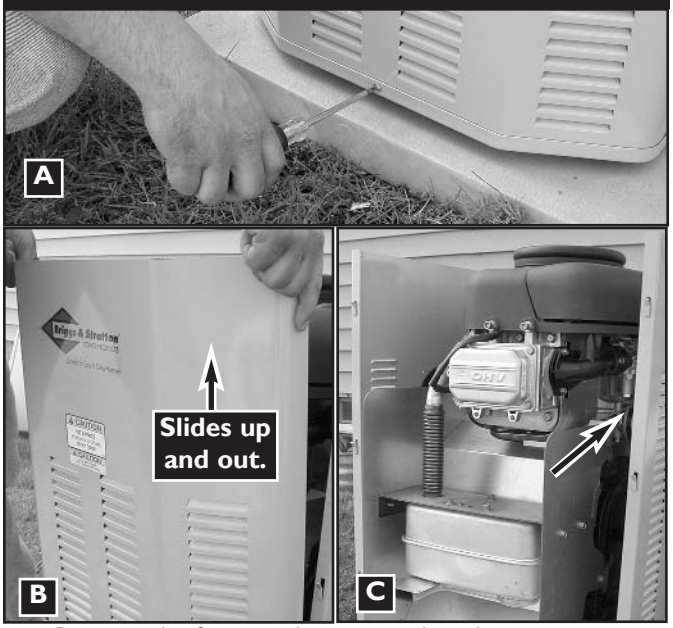
Each Home Standby Generator System is delivered with a conversion kit that includes the plug and jet required to complete the conversion to LP. The insertion tool **(#19570)** is available through the Briggs & Stratton source of supply.

IMPORTANT: Ensure that your (LP) fuel system can deliver fuel to the generator at an inlet pressure between 11 and 14 inches water column including any other appliances using the same fuel supply at the same time.

To reconfigure the fuel system for LP use:

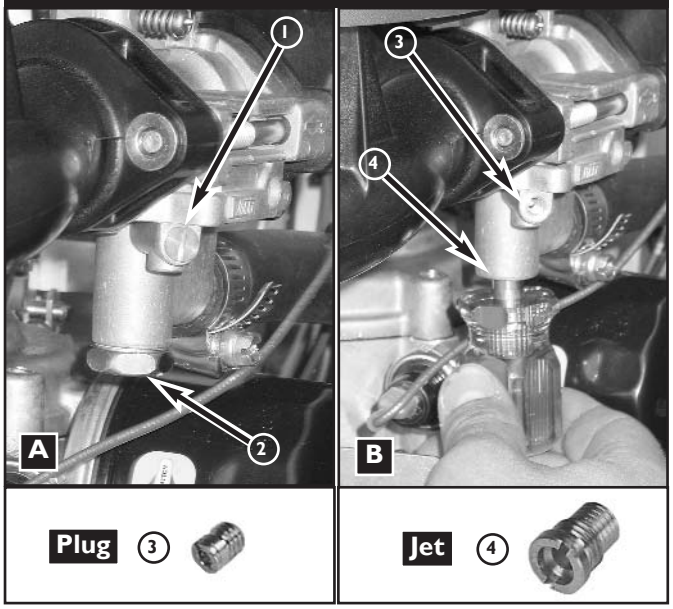
- Shut **OFF** gas line.
- Gain acces to the unit control panel as described on page 9.
- Set the AUTO/OFF/MANUAL switch to **OFF**.
- Set the generator's main circuit breaker **OFF**.
- Remove the 15 Amp fuse.

Figure 5 — Removing The Exhaust Enclosure Panel



- Remove the front enclosure panel as shown in figure 5 A,B & C.
- Locate the mixer and remove the upper brass cap ① with a large straight tipped screwdriver and the 3/4" cap ② with the appropriate wrench (Figure 6A).
- With a small straight tipped screwdriver, install the supplied plug ③ into the upper chamber (Figure 6B).
- Reinstall the brass cap ① .
- Using the special tool **(#19570)**, remove the existing jet from the lower chamber of the mixer inlet.
- Install the LP jet ④ with the same tool.
- Replace the 3/4" brass cap ② .

Figure 6 — Converting Carburetor To Use (LP) Fuel



- Reinstall the front enclosure panel.
- Reinstall the 15 Amp fuse.
- Set the generator's main circuit breaker **ON**.
- Set the AUTO/OFF/MANUAL switch to **AUTO**.
- Reinstall access door.
- Reinstall the roof.

The system is now ready to operate using liquid propane (LP) fuel.

NOTE: To purchase the conversion kit, contact your BRIGGS & STRATTON source of supply.

SYSTEM CHECKS & SETTINGS

Operational Checks

Manual Operation Check (No Load)

Starting the generator for the first time should be done without any electrical loads connected, as follows:

- Set the AUTO/OFF/MANUAL switch to the **OFF** position.
- Set generator's main circuit breaker to the **OFF** (open) position.
- Install the 15 AMP fuse in the control panel.
- Make sure that all fuel shut-off valves are open.
- Set the AUTO/OFF/MANUAL switch to **MANUAL**.

The unit will go through its starting cycle.

NOTE: The Home Standby Generator System may have air trapped in the fuel lines. It may take a few minutes to purge the air from the lines before the unit will start.

- Listen for any unusual noises, vibrations or other indications of abnormal operation. Check for oil leaks, evidence of overheating and any other abnormalities while the unit is running.

When you are satisfied with the operation of the generator;

- Set the AUTO/OFF/MANUAL switch to **OFF**.

The unit should shut down.

Automatic Operation Check (Load Transfer)

To check the system for proper automatic operation:

- Set the AUTO/OFF/MANUAL switch to the **OFF** position.
- Ensure that utility power is connected to the UTILITY CONNECTION lugs of the Automatic Transfer Switch.
- Set the main distribution panel circuit breaker (Utility Power) to **ON.**
- Set the AUTO/OFF/MANUAL switch on the generator to **AUTO**.

The generator is now set for automatic operation.

- Turn **OFF** the main distribution panel circuit breaker (Utility Power). This is the breaker that supplies utility power to the automatic transfer switch.

The engine will crank and start once the utility voltage drops and the sensor has timed out. After starting, the transfer switch will transfer circuit loads to the generator. Let the system go through its entire automatic operation sequence.

DANGER

Generator output voltage is now supplied to the generator system. Contact with energized parts will result in dangerous and possibly fatal electrical shock.

- **Proceed with caution.**

- Observe the protected circuits and ensure that all anticipated circuits are functioning
- With the generator supplying power, turn **ON** the main distribution panel circuit breaker (Utility Power).

NOTE: If the unit has run for 5 minutes or more, it will transfer the load back within 10 seconds. If the unit has run for less than 5 minutes, it will continue to run for approximately 5 to 6 minutes (to warm up the engine) and then transfer the load back to utility power.

- About one minute after re-transfer, the engine will shut down.

This completes the the test procedures for automatic operation. The Home Standby Generator System will now start automaticly when the utility power is lost and will supply power to the protected circuits in the home.

Generator Load Tests (Full Rated Electrical Capacity And Fuel Consumption)

To test the generator output with electrical loads applied, proceed as follows:

- Set the generator's main circuit breaker to **OFF**.
- Set the generator's AUTO/OFF/MANUAL switch to **OFF**.
- Turn the main distribution panel circuit breaker (Utility Power) **OFF**.
- Set the AUTO/OFF/MANUAL switch on the generator to **AUTO**.

The engine should crank and start immediately.

- Let the engine stabilize and warm up for a few minutes.

- Set the generator's main circuit breaket to **ON**. (Generator power is now supplied to the GENERATOR CONNECTION lugs of the automatic transfer switch.)

DANGER

Contact with energized parts will result in dangerous and possibly fatal electrical shock.

• **Proceed with caution.**

- Turn **ON** electical loads within the protected circuits. Continue until the full rated output of the generator is reached.
- Use an accurate AC voltmeter (BRIGGS & STRATTON Multimeter **#19464**) to check generator output voltage across the primary load lugs that supply power to the protected circuits. Voltage should be greater than 216VAC
- Connect an accurate AC frequency meter (BRIGGS & STRATTON Freq/Cap Meter **#19543**) across the primary load lugs of the protected circuits. Frequency should be 57-62.5 Hz.

IMPORTANT: Do not proceed until you are certain that generator AC voltage and frequency are correct and within the limits stated above. In addition, while taking these measurements, make sure that all gaseous fuel appliances in the dwelling are turned **ON.** If any parameter is outside the ranges mentioned, refer to BRIGGS & STRATTON engine service manual **(# 272147)** for governor adjustment procedures.

- Check generator output between one of the generator connections and the neutral lug, then between the other generator connection and the neutral lug. In both cases, the voltage reading should be about 120VAC.
- Let the Home Standby Generator System run at full rated load for 20-30 minutes. Listen for unusual noises, check for excessive vibration or other indications of abnormal operation. Check for oil leaks, evidence of overheating etc.
- Turn the main distribution circuit breaker **ON**.

NOTE: If the unit has run for 5 minutes or more, it will transfer the load back within 10 seconds. If the unit has run for less than 5 minutes, it will continue to run for approximately 5 to 6 minutes (to warm up the engine) and then transfer the load back to utility power.

- About one minute after re-transfer, the engine will shut down.
- Set the generator's main circuit breaker to **OFF**.
- Set the AUTO/OFF/MANUAL switch to **OFF**.

Stopping The System For Maintenance

To disable the unit from starting automatically:

- Ensure that the utility power is **ON** and supplied to the UTILITY CONNECTION lugs of the transfer switch.
- Set the AUTO/OFF/MANUAL switch to **OFF**.
- Set the generator's main circuit breaker to its **OFF** position.
- Pull disconnect switch out.
- Remove the 15 AMP fuse, as appropriate to your maintenace needs.

Setting Exercise Timer

The Home Standby Generator System is equipped with an exercise timer that will start and exercise the system once every seven days. During this exercise period, the unit runs for approximately 20 minutes and then shuts down. Electrical load transfer does not occur during the exercise cycle (unless a utility power outage occurs).

A switch on the control panel is labeled SET EXERCISE (See item 2 on page 11).

The *specific day and the specific time of day* this switch is pressed is retained by a memory chip on the Control Module Assembly (CMA). The day and time is then referenced by the chip to automatically initiate the system exercise cycle in seven days.

To perform the SET EXERCISE procedure:

- Choose the day and time you want your Home Standby Generator System to exercise.
- On that day and time, set the AUTO/OFF/MANUAL switch to **OFF**.
- Press and hold down the **SET EXERCISE** switch for two seconds.
- Release the SET EXERCISE switch.
- Set the AUTO/OFF/MANUAL switch to **AUTO**.

Set Exercise is complete.

As an example, if you press the SET EXERCISE switch on Sunday morning at 10:00 AM, the unit will run an exercise cycle the following Sunday at 10:00 AM (± 60 minutes).

NOTE: SET EXERCISE will only work if the unit is in the AUTO mode and this exact procedure is followed. The exerciser *will* need to be re-set if the 12 VDC battery is disconnected, if you remove the 15 AMP fuse or you start the unit manually (as when the unit is demonstrated).

If you want to change the day and time the unit exercises, simply perform the SET EXERCISE procedure on the exact day and time you want it to take place.

Engine Maintenance

DANGER

Remove 15 Amp fuse from control panel. Disconnect spark plug wires from spark plugs.

• This will prevent accidental engine start.

Check fuel lines and fittings frequently for cracks or leaks. Replace if necessary.

Checking Oil Level

At recommended service intervals and before placing the Home Standby Generator System in service, check the engine oil level, as follows:

- Remove the roof, (Page 9).

The dipstick is incorporated with the oil fill cap.

- Remove the cap and wipe the dipstick clean with a cloth.
- Insert dipstick fully and seat the cap.
- Remove and check oil level.
- If oil level is low, slowly add recommended oil to bring level to "Full" mark on dipstick (Figure 7).

Changing the Oil and Oil Filter

Figure 7 — Oil Dipstick Markings

Oil capacity is approximately 1-1/2 quarts (48 ounces or 1.6 liters) when changing oil and filter. Use only 5W-30 API Service Grade SJ/CF or greater synthetic oil.

Change oil after every 50 operating hours

Replace oil filter every 100 operating hours

If you are using this engine under dirty or dusty conditions or in extremely hot weather, change the oil more often.

Use the following instructions to change the oil while the engine is still warm:

- Remove the oil filter cover and the oil drain cover from the sides of the generator enclosure panels. Place the oil drain hose into a suitable container. Grasp the oil drain fitting and push it in towards the engine. Rotate it counterclockwise to its stop and pull the fitting outwards slowly. Oil should begin to flow out of the oil drain hose.
- After the oil is drained, grasp the oil drain fitting and push in while rotating clockwise until it locks in place. Position the oil drain hose in its storage clip.
- Place the oil drain tray on the square tubular frame under the oil filter and remove the oil filter.
- Wipe the filter adapter flange clean with a cloth.
- Coat the o-ring of the new filter with fresh clean engine oil. Turn the new filter clockwise by hand until the gasket contacts the filter adapter, then tighten 1/2 to 3/4 turn more.
- Service engine with oil to the **"FULL"** mark on the dipstick.
- Install and seat the oil fill cap.
- Run the engine for a few minutes.
- Stop the engine and check for oil leakage around the oil filter.
- Recheck oil level.

Cleaning or Replacing the Spark Plug

Replace the plug every year. Use the recommended spark plugs gapped at 0.030 in. (0.76 mm).

- Remove the roof as described on page 9.
- Remove the cover over the generator control panel and remove the 15 AMP fuse.
- Pull the spark plug wire off of the spark plug.
- Clean around the spark plug and remove it from the cylinder head.
- Clean off carbon deposits on the spark plug electrode using a wire brush or commercial solvent. *Do not blast clean.*
- Ensure that the plug gap is set as recommended.

- Install the correctly gapped spark plug into the cylinder head. Torque to **15 lb. ft.**
- Reinstall the spark plug wire securely.
- Replace the 15 AMP fuse.
- Set the AUTO/OFF/MANUAL switch to **MANUAL**.

The engine should start and run.

- Shut the engine down by selecting **OFF** at the AUTO/OFF/MANUAL switch.
- Set the AUTO/OFF/MANUAL switch to **AUTO** to return the generator to standby mode.
- Replace the protective cover over the generator control panel.
- Replace the roof.

Service Air Cleaner

The engine's air cleaner is one of the most important areas to maintain. The engine will not run properly and will be damaged if it is run with a dirty air cleaner system.

Use only genuine BRIGGS & STRATTON parts.

Clean the filter cartridge every 100 hours of operation and the foam filter every 25 hours.

Clean or replace more often in dusty or dirty conditions.

> **CAUTION:** Never run this equipment without the complete air cleaner system installed on the engine. Failure to do so will result in premature engine wear and significantly reduced engine life.

To service the air cleaner components:

1. Remove the roof and access panel as decribed on page 9.
2. Remove the 15 amp fuse.
3. Set the AUTO/OFF/MANUAL switch to **OFF**.
4. Unsnap and remove the air filter cover
5. Remove the air filter cartridge and clean (lightly tap to remove large particles), inspect or replace.
6. Remove the foam filter and clean with low air pressure or replace.
7. Install foam filter first.
8. Install clean air filter cartridge and make sure that the rubber seals are in contact with the mounting all around the filter.
9. Engage the two clips of the air filter cover into their slots and close the air filter cover.
10. Engage the locking latch of the filter cover and snap shut.

Replace all filter components if very dirty or damaged.

NOTE: Do not use petroleum solvents, e.g. kerosene, which will cause the cartridge to deteriorate.

Inspect Spark Arrester Screen

The engine exhaust muffler has a spark arrester assembly that is secured to the bottom of the muffler with five sheet metal screws. Inspect the assembly every 50 hours of operation or once each year, whichever comes first. The spark arrester must be maintained in good condition by the owner/operator.

Inspect the spark arrester assembly as follows:

1. Remove front panel (see page 9).
2. Remove the three bolts that secure muffler to bracket.
3. Remove the five screws that hold the spark arrestor to the bottom of the muffler. There should be little or no accumulated soot on the assembly.
4. Replace the assembly if burned, torn, perforated or otherwise damaged. Do not use a defective assembly. Consult BRIGGS & STRATTON Technical Services for assistance in replacing the assembly.

•• If screen is not damaged:

- It may be cleaned by gently brushing, using a wire or bottle brush.

Engine Governed Speed

> **CAUTION:** The engine speed was properly adjusted at the factory and should require no additional adjustment. Do not attempt to change engine speed. If you believe the engine is running too fast or too slow, contact the factory for assistance.

CHANGING THE ENGINE GOVERNED SPEED WILL VOID THE ENGINE WARRANTY AND WILL ADVERSELY AFFECT SYSTEM OPERATION.

To assure smooth operation, keep governor linkage, springs and controls free of debris.

Valve Lash

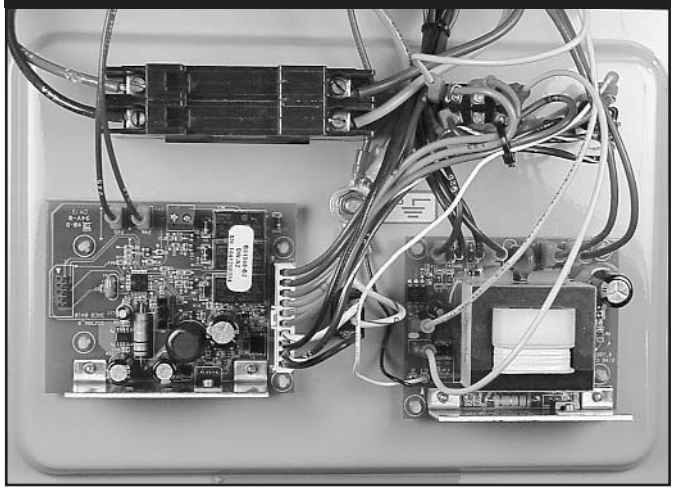
Valve lash must be checked while engine is cold after every 100 hours of operation. Adjust if necessary. Refer to the BRIGGS & STRATTON Engine Service Manual **(#272147) for specifications.**

The Control Module Assembly (CMA)

(See Generator Enclosure [Page 9] for access to the control panel.)

The control module assembly (CMA) and the battery charge assembly (BCA) are printed circuit boards that contain the logic circuits that operate & protect both the generator and the dwelling. It is mounted on the back side of the generator control panel (Figure 8).

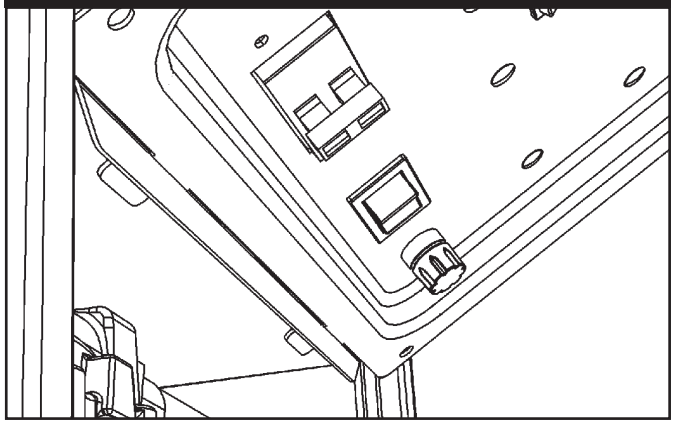
Figure 8 — CMA & BCA Location



To access the CMA board:

- Remove the four screw securing the control panel to the generator enclosure.
- Fold the panel down in the slots provided for support as shown in figure 9.

Figure 9 — Control Panel In Its Mounting



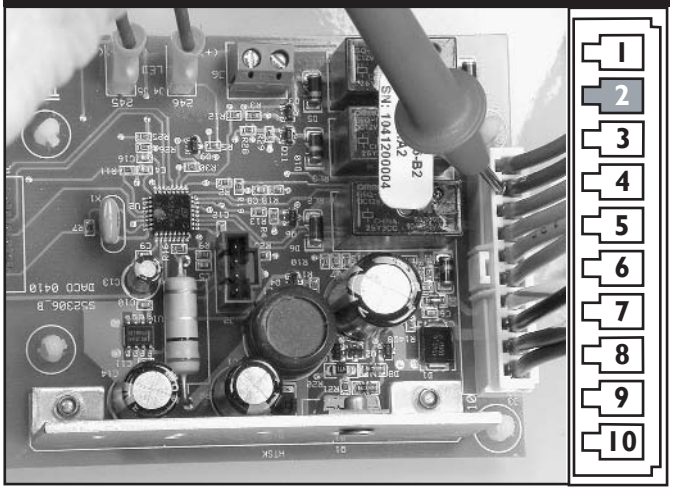
The CMA is the control center of the unit. Its functions depend on input from various circuits throughout the Home Standby Generator System. Before replacing the CMA, all other circuits must be tested for proper operation. When a failure in the CMA has been determined, the CMA must be replaced as a complete board assembly. The components are not serviceable.

The functions of the CMA board include:

- Set Exercise Timer
- Manual Start
- Automatic Start
- Automatic Cool-Down Timer
- Electronic Fault Detection
- Automatic Shutdown Protection

The CMA board is connected to various generator components through a 10-pin connector that is mounted directly on the board (Figure 10).

Figure 10 — 10-Pin Connector



When being directed to measure an electrical value, the location/procedure of the measurement is shown in the form of a picture. The corresponding pin of the connector is shaded in a graphic illustration that is specific to each test being performed.

A detailed illustration of the entire connector, as well as the functions of each individual pin is given on page 19.

Fault Detection Conditions

The generator may have to run for long periods of time with no operator present. For that reason, the Control Module Assembly (CMA) is equipped with detection circuits that automatically shut the generator down in the event of a potential failure. These fault conditions are designed to protect the dwelling as well as the generator unit and include:

Indication:	**Fault:**
2 Blinks	Low Oil Pressure
4 Blinks	Engine Failed to Start
5 Blinks	Low Frequency
6 Blinks	Engine Over-Speed

Troubleshooting flowcharts for circumstances that are outside the capacity of the CMA to protect are also provided later in this section.

Power During Fault Conditions

Whenever the Home Standby Generator System is in an uncorrected fault condition, the automatic transfer switch defaults to UTILITY power, when available. This means that when UTILITY power is available, it will automatically be applied to all the circuits in the dwelling.

Resetting The Fault Detection System

An operator or a technician must reset the fault detection system each time it is activated.

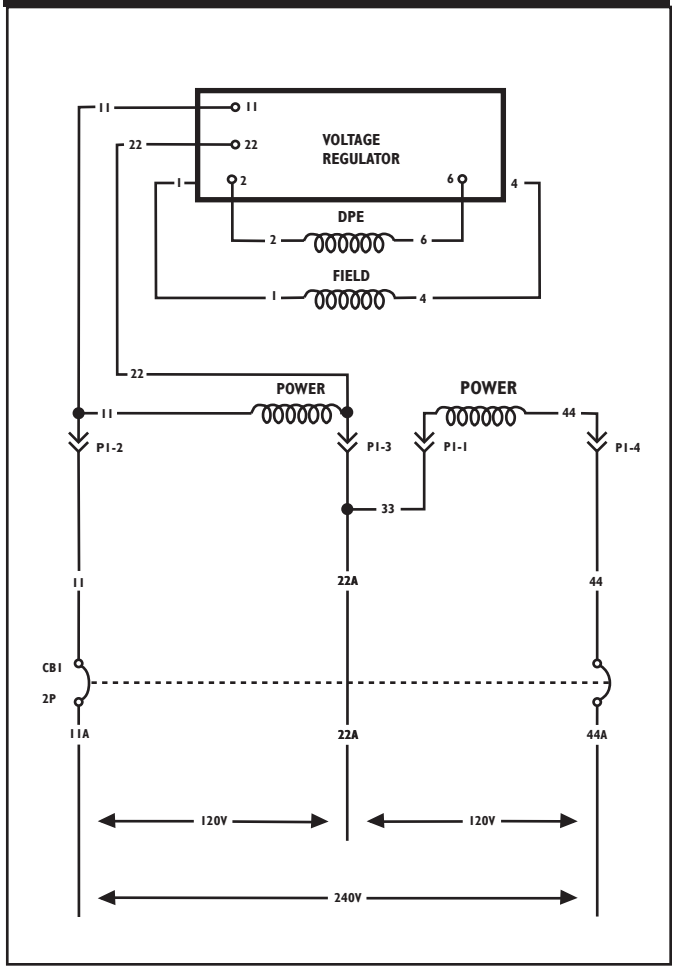
- Set the AUTO/OFF/MANUAL in the **OFF** position for 30 seconds or more.
- Set the AUTO/OFF/MANUAL in the **AUTO** position.

If the fault is not corrected, it will be detected again and the unit will start and shut down. At this point the LED will flash with the corresponding number of blinks.

Generator AC Connection System

A single-phase, three-wire AC system is used in the Home Standby Generator System. The stator assembly consists of a pair of stationary windings with two leads brought out of each winding. The two windings are connected together in series, resulting in a fixed 120/240VAC, 60Hz output. Stator output leads #11A and #44A are two hot leads. The junction of leads #22 and #33 form the neutral lead #22A (Figure 11).

Figure 11 — System (AC) Connections



CMA PINS, SCHEMATIC & WIRING DIAGRAMS

Figure 12 — Control Module Assembly — Connector Pins, Functions & Wire Numbers For Models 1897, 1976 & 1977

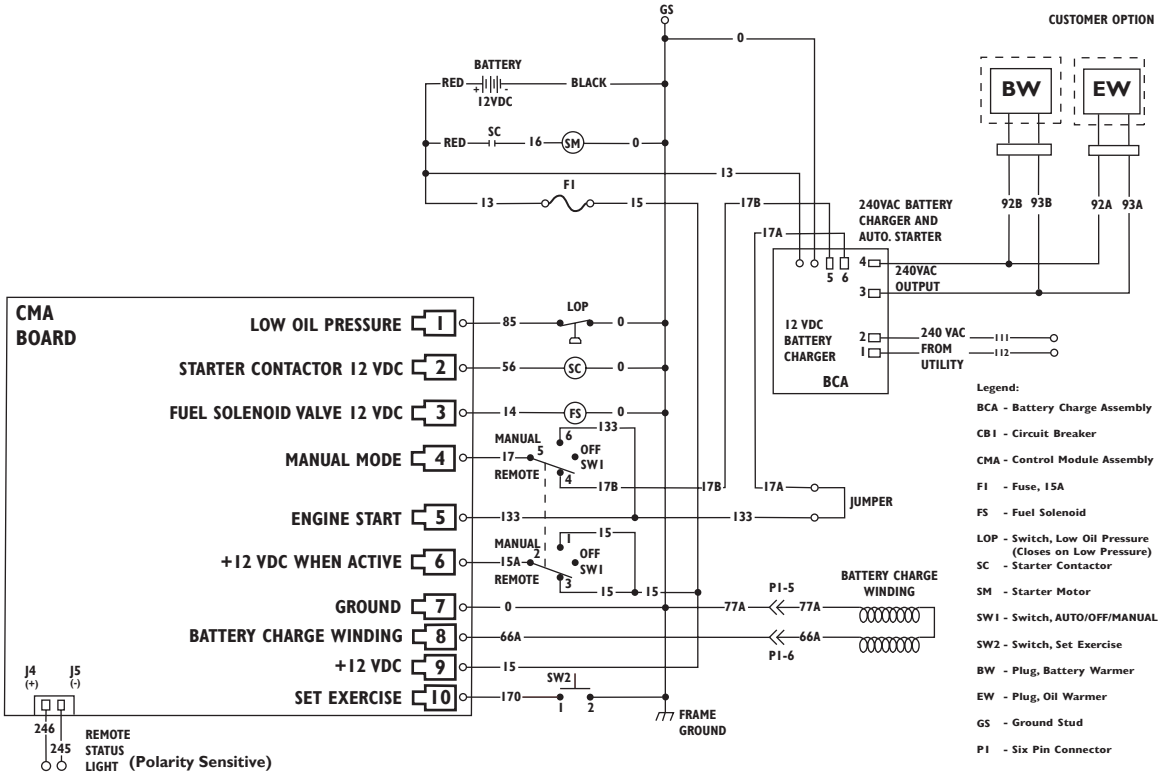


Figure 13 — Six Pin Connector, Voltage Regulator & Stator

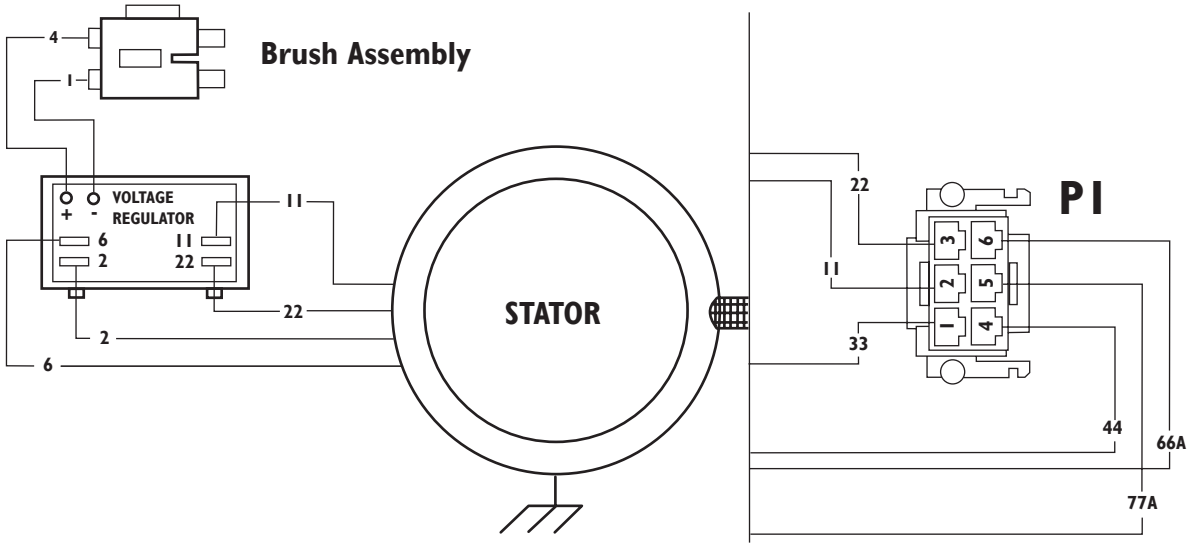


Figure 14 — Wiring Diagram Models 1897, 1976 & 1977

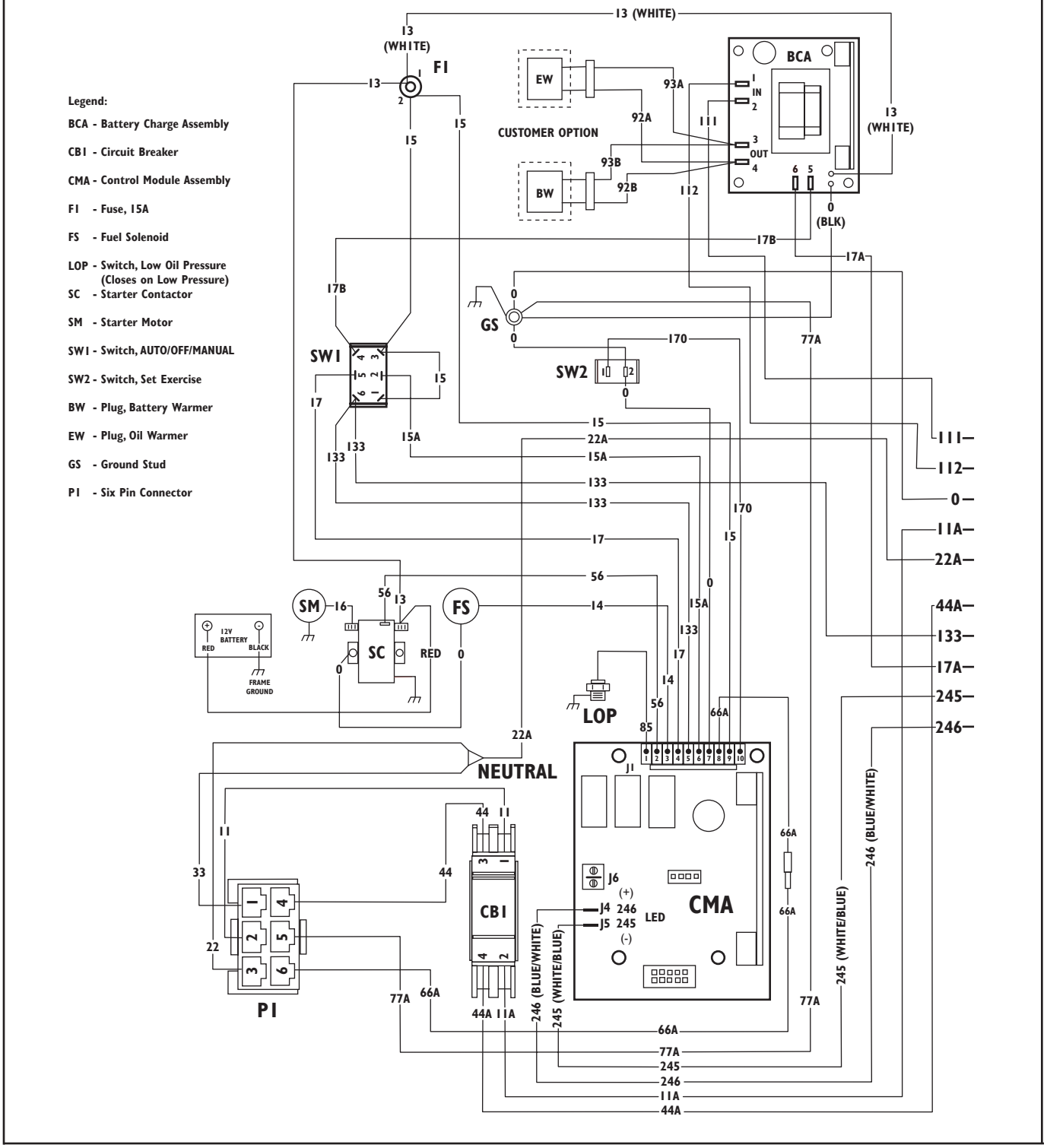
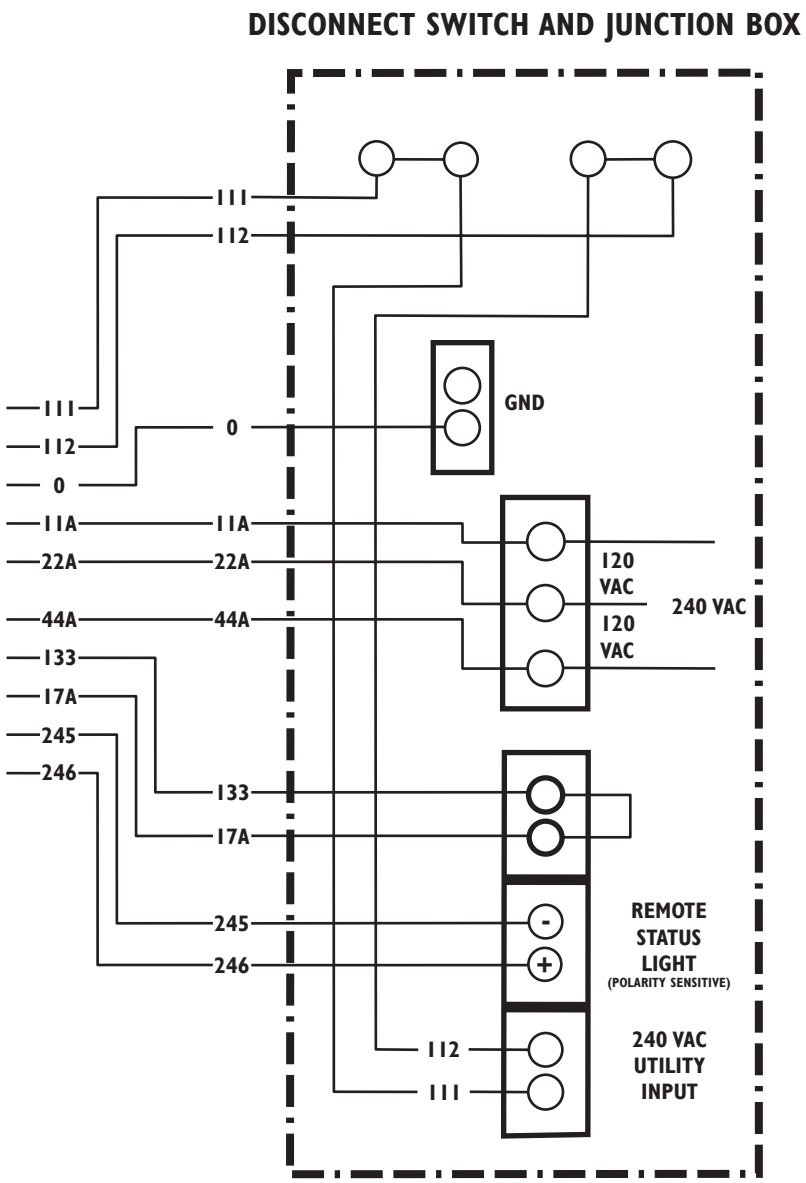


Figure 15 — Disconnect Switch & Junction Box



TROUBLESHOOTING LED FAULTS

Low Oil Pressure: (Two Blinks [• •])

The generator unit is equipped with a low oil pressure switch (LOP). The contacts of the switch are normally closed (NC) and are held open by engine oil pressure during operation. Should the engine oil pressure drop below a safe psi, the switch contacts will close, creating a connection to ground and the engine will be shut down.

The following sequence of events takes place during the first 20 second interval after engine startup:

- Low Oil Pressure switch (LOP) is normally closed (NC).
- CMA bypasses (LOP) switch during initial crank.
- LOP switch opens after engine has started and produces oil pressure.
- The CMA board senses engine is running by monitoring frequency on **Pin #8, Wire #66A** and **Pin #7, Wire #0**.
- Once CMA senses engine is running, the CMA looks for a ground on **Wire #85**.
- If ground is present on **Wire #85**, CMA will shut engine down and the remote LED will flash in a set of two blinks.

To remedy a low oil pressure condition, fix any obvious oil leak and/or add the recommended oil to the **FULL** mark on the dipstick (See page 15).

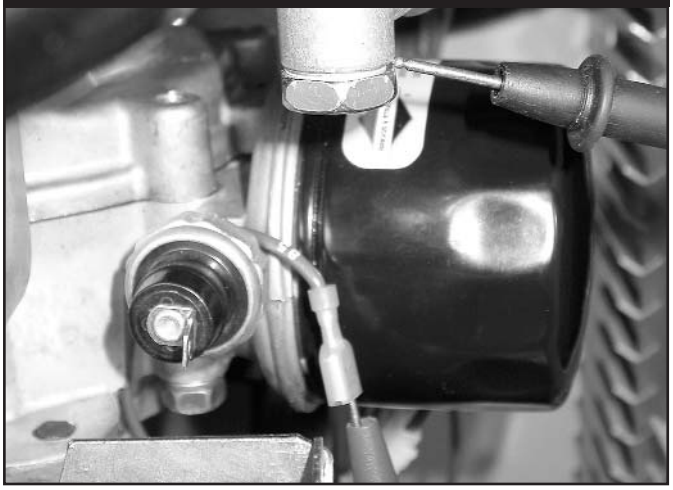
- Reset the Fault Detection system as described on page 18.
- Start the generator (No Load, as described on page 13).

If a low oil pressure condition still exists, the engine will start and shut down after about 20 seconds. The LED will again flash in a set of two blinks.

Low Oil Pressure Troubleshooting Procedure:

- Set the AUTO/OFF/MANUAL switch to **OFF**.
- Set the generator circuit breaker to **OFF**.
- Remove the 15 Amp fuse.
- Remove utility voltage at the disconnect box.
- Remove 10-pin connector from the CMA board.
- Remove **Wire #85** from (LOP) switch (Figure 16).

Figure 16 — Measure Wire #85 From PSI Switch



- Measure for short-to-ground on **Wire #85.**

•• If a short is detected:

- Repair and/or replace wiring, as necessary.

•• If no short is detected:

- Remove oil pressure switch and install oil pressure gauge (1/8" NPT).
- Re-install connector at CMA board.
- Re-install 15 Amp fuse.
- Set the AUTO/OFF/MANUAL switch, to **MANUAL.**

The engine should start and run.

NOTE: Oil Pressure @ 70° F (21° C):
10 ~ 50 PSI
(0.7 ~ 3.5 Bar)

•• If oil pressure is low:

Refer to BRIGGS & STRATTON engine service manual **(#272147)** for repair procedures.

•• If oil psi is OK and no short-to-ground exists:

- Replace oil pressure switch.

•• If switch opens with oil pressure and no short-to-ground:

Verify that there are no other faults BEFORE replacing the CMA circuit board.

- Replace the CMA board.
- Reinstall the 15 Amp fuse.
- Reinstall utility voltage at the disconnect box.
- Reset the generator circuit breaker.
- Set AUTO/OFF/MANUAL switch to **AUTO**.
- Remove utility power and verify system operation.
- Reinstall all enclosure panels and return system to automatic standby configuration.

Engine Fails To Start: (Four Blinks [• • • •])

This is a feature of the control module assembly (CMA) that prevents the standby unit from damaging itself by continually attempting to start, in spite of a problem that is beyond the CMA's ability to monitor. Whenever the unit is directed to start (MANUAL or AUTO), the CMA delivers 12VDC from **Pin #2, Wire #56** to the starter contactor for *approximately* 15 seconds. It then pauses for *approximately* 15 seconds and repeats the attempt until *approximately* 90 seconds of start time have accumulated.

During the starting attempt, the CMA delivers 12VDC from **Pin #3, Wire #14** to the fuel solenoid while monitoring **Pin #8, Wire #66A** for a minimum frequency signal. The CMA terminates delivery of start voltage to the starter contactor. If the minimum frequency signal has not been sensed after the accumulative start time, the CMA terminates the engine cranking cycle and triggers the LED to flash in a set of four blinks.

This directs the service technician to examine supporting systems that could prevent the standby system from operating.

For example:

- Fuel Solenoid Failure
- Fuel Supply Discrepancies
- Failed Starter Motor
- Failed Starter Motor Connections
- Engine Component Failures
- Clogged Engine Air Filter
- Failed Ignition
- Failed and/or Damaged Wiring
- Clogged fuel regulator atmospheric vent.

Troubleshooting Procedure:

- Reset the fault indication LED by selecting **OFF** at the AUTO/OFF/MANUAL switch for 30+ seconds.
- Set the AUTO/OFF/MANUAL switch to **MANUAL** and observe system operation.

Two possible conditions will exist;

Engine cranks but fails to start: (See below).

Engine fails to crank: (Go to page 28).

Engine Cranks But Fails To Start:

Ensure that adequate fuel is available to operate the Home Standby Generator System.

- Inspect the fuel supply to verify that the main supply is **ON**.
- Inspect fuel supply plumbing for any shut-off valves that may be closed.

NOTE: Fuel shut-off valves are often installed as a discretionary convenience to the owner. Therefore, the number of shut-off valves may vary with each installation. Be sure to trace the entire fuel supply system.

- Correct any fuel supply problems.
- Purge the fuel supply lines of air.
- Reset the fault indication LED by selecting **OFF** at the AUTO/OFF/MANUAL switch for 30+ seconds.
- Set the AUTO/OFF/MANUAL switch to **MANUAL** and observe system operation.

•• If no fuel supply discrepancies are present, and engine cranks but fails to start:

- Gain access to the control panel and engine components (see page 9).

Inspect the standby unit for any obvious broken or corroded electrical connections. Starting at the control panel, visually inspect wiring and terminals associated with the following components:

- Spark Plug Lead _____

• Remove the plug lead and check that the plug is tight in the engine. _____

- Starter Contactor _____
- Fuel Solenoid _____
- Generator and Engine Grounds _____
- Starter Motor _____

WARNING

Utility voltage is present at the CMA.

• Use caution to avoid personal electrical shock or damage to the system.

Gain access to the control module assembly (see page 17) and visually inspect:

- All component connections _____
- 10-Pin connector on the CMA board. _____

Repair and/or replace any damaged wiring or terminal connections.

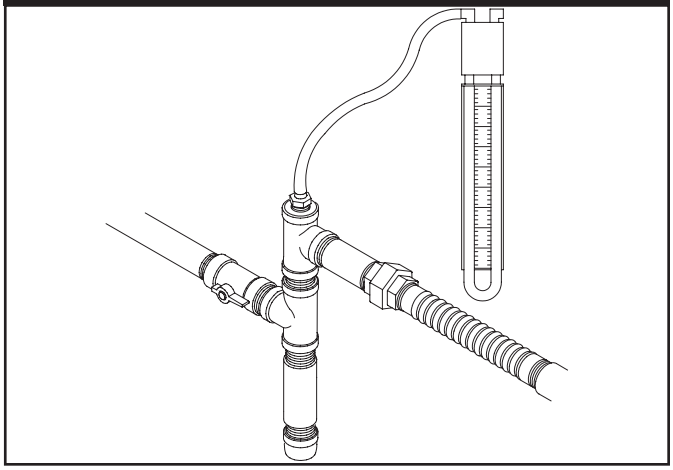
• Reset LED, attempt **MANUAL** start and observe system operation.

•• If there are no obvious electrical faults, and the problem persists:

Verify that fuel pressure is available to the fuel solenoid.

• Install a manometer, as illustrated in figure 17.

Figure 17 — Temporary Manometer Installation



11 TO 14 inches of water (in W.C.) - LP

5 to 7 inches of water (in W.C.) - NG

should be measured under full electrical load with all gaseous fuel appliances turned **ON**.

•• If the proper fuel pressure is not present:

- Repair and/or replace fuel delivery system.
- Re-test fuel pressure as described above.

•• If fuel pressure is acceptable:

Check the Fuel Solenoid.

While the engine is cranking:

• Check for DC voltage at the fuel solenoid (Figure 18).

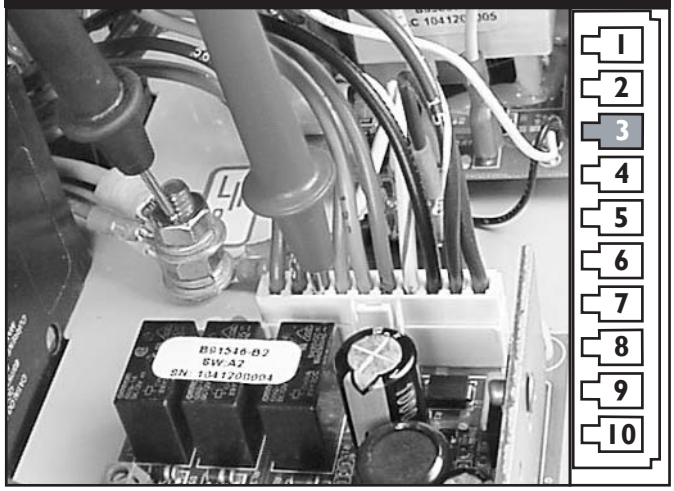
Figure 18 — Check Fuel Solenoid For DC Voltage

7-12VDC should be measured.

•• If no voltage is present at the fuel solenoid:

• Check for voltage at **Pin #3, Wire #14** at the CMA harness connector (Figure 19).

Figure 19 — Check Pin #3, Wire #14 At CMA Connector



7-14VDC should be measured.

•• If no voltage is present at **Pin #3 Wire #14**:

Verify that there are no other faults
BEFORE
replacing the CMA circuit board.

• Replace the CMA Circuit Board.

•• If voltage is present at the solenoid:

The fuel solenoid allows fuel pressure to the fuel regulator. The regulator delivers fuel to the mixer when a negative atmoshere is created by the intake stroke of the engine piston. If fuel and fuel flow are present without ignition, the gas must be expelled through the exhaust pipe.

Gas Regulator

The gas regulator is an atmospheric zero governor which acts like the float and needle valve in a gasoline carburetor. Air flow through the venturi of the carburetor creates a vacuum which acts on the sealed internal side of the gas regulator diaphram. Positive atmospheric pressure on the other side of the diaphram then forces it toward the vacuum, depressing mechanical levers that pull the valve seat away from the valve which allows fuel to flow as long as the demand persists. When the vacuum ceases, a spring force pushes on the lever assembly and forces the diaphram and valve seat back against the valve -shutting off the fuel flow.

NOTE: Fuel should not flow through the gas regulator when the engine is not running.

The easiest way to check the mechanical operation of the fuel solenoid and the fuel regulator is to smell the exhaust during the starting sequence.

DANGER

Extinguish all sources of fire and do not smoke while performing this inspection.

•• If fuel is detected, proceed to Check Ignition Spark on page 26.

•• If no indication of fuel is detected at the exhaust pipe during the starting sequence:

Check the fuel solenoid and/or fuel regulator for evidence of mechanical failure (you can feel the solenoid "click" when it activates).

• Remove the pipe plug that caps the regulator test port and install a manometer (BRIGGS & STRATTON **#19495**) see figure 20.

Figure 20 — Fuel Regulator With Manometer Installed

11 TO 14 inches of water (in W.C.) - LP
5 to 7 inches of water (in W.C.) - NG
should be measured under full electrical load with all gaseous fuel appliances turned **ON**.

•• If no fuel pressure is measured:

• Replace the fuel solenoid.

•• If fuel pressure is measured:

Refer to figure 21 for the following procedure.

Figure 21 — Testing The Fuel Regulator

The fuel regulator has two atmospheric vent that balances diaphram pressures.

- Install a 1/8" NPT barb fitting that has a 2 ft. length of hose attached to it.
- Plug the other vent hole.
- Gently blow into the hose.

CAUTION: Do not use compressed air. The regulator diaphram is easily ruptured.

While the fuel solenoid is energized, this pressure will allow fuel to pass through the regulator. This fuel flow will be indicated on the manometer as a decrease in pressure.

•• If no fuel flow is detected:

• Replace the fuel regulator.

•• If fuel flow is detected:

• Refer to the BRIGGS & STRATTON Engine Service Manual **(#272147)** to determine the condition of the gaseous fuel carburetor.

Check Ignition Spark:

- Turn off the manual fuel valve that supplies fuel to the generator.
- Refer to the Briggs & Stratton Engine Service Manual **(#272147)** to determine the proper method for checking the engine for ignition spark.

Low Frequency: (Five Blinks [• • • • •])

The low frequency shutdown feature is designed to protect the generator and the devices connected to the protected circuits from an output frequency that is too low. The CMA senses a frequency at **Pin #8, Wire #66A and Pin #7, Wire #0**.

NOTE:
No Load RPM = **3750 ± 100 RPM**
Full Load RPM = **3420 ± 100 RPM**
Full electrical load -with all gaseous fuel appliances turned **ON**.

If output frequency drops below a minimum for more than a few seconds, the CMA will shut down the generator and trigger the diagnostic LED to blink in a set of five blinks.

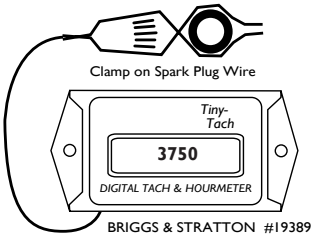
This condition may be caused by a failed engine governor, by excessive loads on the protected circuits of the house, fuel delivery problems, engine failure or an failure in the generator wiring.

Low Frequency Troubleshooting Procedure:

Verify that the Control Module Assembly (CMA) is grounded.

Check engine RPM.

- Set engine RPM to 3750, as specified in the BRIGGS & STRATTON engine service manual **(#272147)**.



- Set AUTO/OFF/MANUAL switch to **MANUAL** and allow engine to start and stabilize.
- Measure voltage and frequency at **Pin #8, Wire #66A** *or* **Pin #7, Wire #0 and Ground** as shown in figure 22 (Pin 8 shown).

Figure 22 — Voltage And Frequency At Pin #8, Wire #66A And Ground

62-62.5 Hz "No Load" should be measured.

NOTE: Follow the Frequency Measurement instructions that apply to the type of meter you are using.

Verify that there are no other faults
BEFORE
replacing the CMA circuit board.

•• If frequency and voltage are correct:

- Replace CMA Circuit Board.

•• If frequency is not correct:

Check engine RPM.

- Set engine RPM to 3750 ± 100, as specified in the BRIGGS & STRATTON engine service manual **(#272147)**.

•• If no frequency is measured:

- Check for open Battery Charge Winding (Refer to "Checking The Battery Charge Winding (BCW) Through The P1 Connector" on page 32).
- Repair or replace as necessary.

Over Frequency: (Six Blinks [• • • • • •])

This feature of the Home Standby Generator System protects devices that are wired into the protected circuits by shutting down the generator if it runs faster than the governed RPM limit (3750 RPM).

The control module assembly (CMA) senses frequency output at **Pin #8, Wire #66A and Pin #7, Wire #0.**

Generator output frequency is directly proportional to engine RPM. If frequency gradually increases from 60 Hz and exceeds 72 Hz for five seconds, the CMA shuts the generator down and directs the LED to flash in a set of six blinks.

If the generator output frequency exceeds 75 Hz, the CMA shuts the generator down instantly and initiates the LED to flash in a set of six blinks.

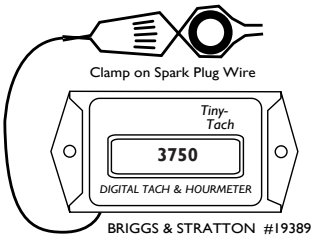
The reason for this latitude in sensing output frequency is that often a governor will hunt for the desired setting. This causes variable frequency outputs that are not harmful until they reach the 72 Hz limit. Should the governor fail completely, the RPM will increase uncontrolled. In this case, the generator will appear to stall immediately after starting. In reality, it is shut down when the output frequency reaches harmful levels.

Over Frequency Troubleshooting Procedure:

- Select **MANUAL** at the AUTO/OFF/MANUAL switch and allow engine to stabilize.

Check engine RPM.

- Set engine RPM to 3750, as specified in the BRIGGS & STRATTON engine service manual **(#272147)**.



- Measure voltage and frequency at **Pin #8, Wire #66A** *or* **Pin #7, Wire #0 and Ground** as shown in figure 22.

NOTE: Follow the Frequency Measurement instructions that apply to the type of meter you are using.

•• If frequency is correct:

Verify that there are no other faults
BEFORE
replacing the CMA circuit board.

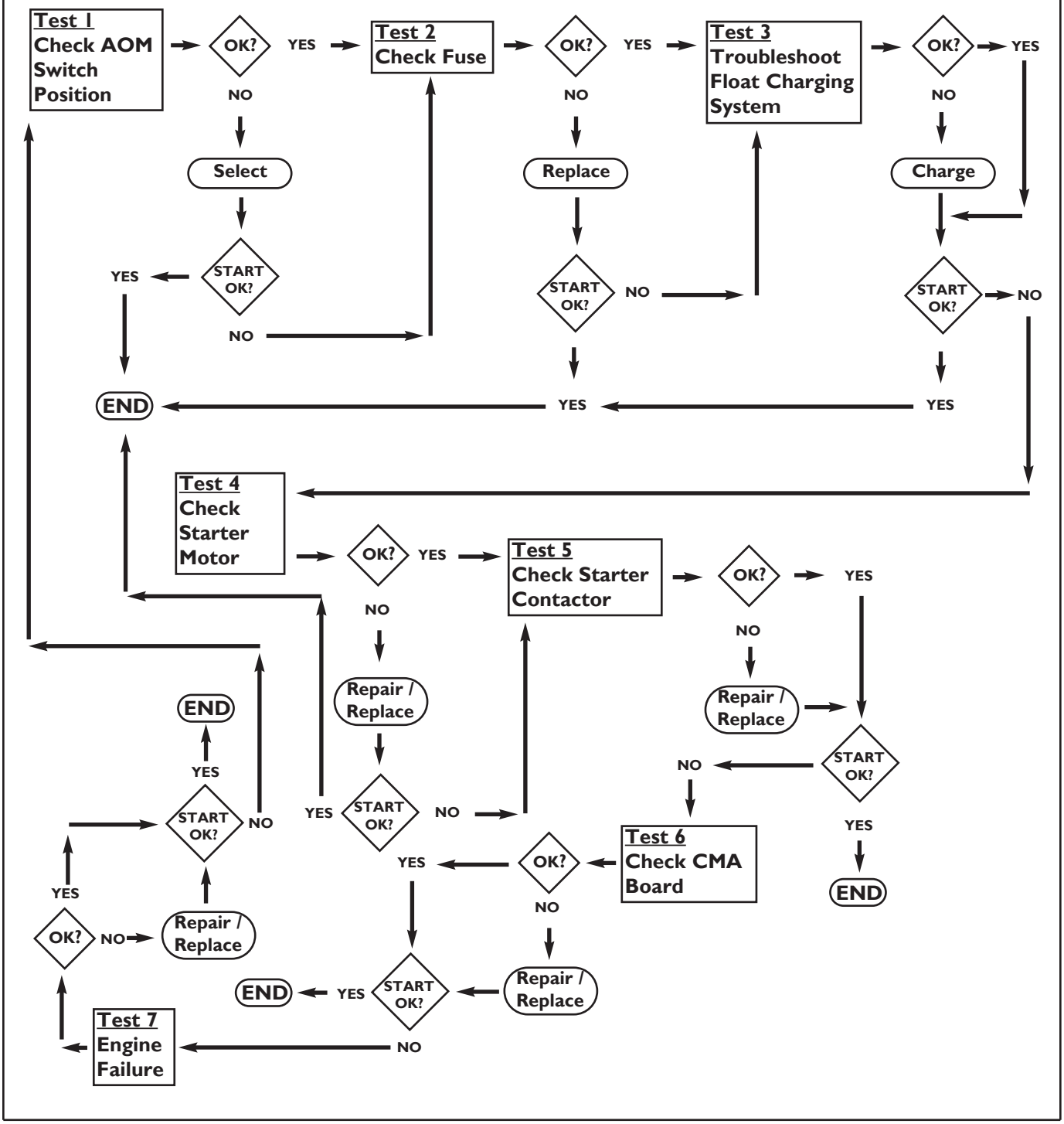
- Replace CMA Circuit Board.

•• If frequency is not correct:

Check engine RPM.

- Set engine RPM to 3750, as specified in the BRIGGS & STRATTON engine service manual **(#272147).**

Figure 23 — Troubleshooting An Engine That Fails to Crank



Troubleshooting An Engine That Fails To Crank

Refer to figure 23

Test 1: — Check (AOM) Switch Position

The (AOM) switch refers to the AUTO/OFF/MANUAL switch which is located on the generator control panel.

- Check LED (if installed).
- Gain access to the control panel (see page 9) and check to make sure the AUTO/OFF/MANUAL switch is not in **OFF** position.

Test 2: — Check Fuse

- Remove the fuse (next to the AOM switch in figure 24) and inspect.

Figure 24 — AUTO/OFF/MANUAL Switch & 15 Amp Fuse

- Replace if necessary and attempt to start by selecting **MANUAL** at the AOM switch.

Test 3: — Troubleshoot The Float Charging System

- Remove the 15 AMP fuse.
- Remove **Wire #13 (White)** from the connector at the 15 AMP fuse.
- Measure for a minimum of 12VDC at the spade connector coming out of the Battery Charge Assembly (**Wire #13 [White]**).

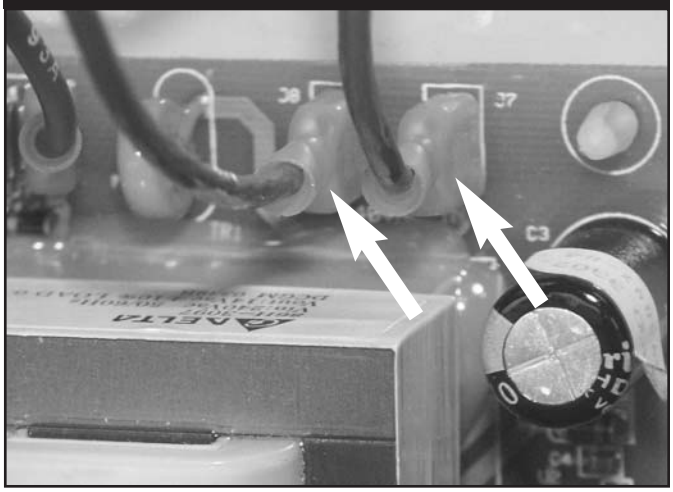
•• If a minimum of 12VDC is measured at the connector:

- Reconnect the spade connector to the 15AMP fuse.
- Remove Wire #13 from the starter contactor.
- Measure for a minimum of 12VDC at the terminal end of **Wire #13**.

•• If proper voltage is not present at the terminal end:

- Check all interconnecting wiring and terminal ends to the starter contactor and repair/replace any faulty components.
- Measure for utility voltage at spades **J8 and J7 with Wires #111 and #112** connected (Figure 25).

Figure 25 — 240VAC Input At Battery Charge Assembly



•• If utility voltage is present at spades **J8 and J7 with wire #s 111 and 112** connected:

- Replace the Battery Charge Assembly (BCA).

•• If 240VAC is not present at spades **J8 and J7 with wire #s 111 and 112** connected:

- Repair and/or replace any defective wiring or terminals between the terminal ends at the BCA and the utility input terminals in the service disconnect box.
- Retest for a minimum of 12VDC at the spade connector of Wire #13 coming from the BCA board.

Test 3A: — Check The Float Charging System

NOTE: Depending on the state of charge of a battery, a slight (+) current flow indicates that the charging system is working. (Approximate current values are: .033 AMP for a fully charged battery to .750 AMP for a depleated battery.)

Follow the recomendations of your meter's instruction manual.

- Remove the (-) negative battery cable.

• Install a (DC) Amp meter between the (-) negative battery terminal and the negative battery cable (Figure 26).

Figure 26 — Checking Battery Trickle Charge

•• If a (+) current flow is detected:

The float charging system is functioning.

• Reconnect the (-) negative battery cable

• Attempt to start the generator from the AUTO/OFF/MANUAL switch by selecting **MANUAL**.

•• If a zero or negative AMP draw is detected:

Test 3B: — Check Battery

• Set the AUTO/OFF/MANUAL switch to **OFF**.

• Remove the 15 AMP fuse.

• Pull disconnect switch at box.

• Disconnect the battery cables.

Using the approved procedure for your battery tester, check the battery's state of charge.

• Recharge the battery if required and retest.

If battery replacement is required, use current BRIGGS & STRATTON recommended replacement part.

• Reconnect the battery cables.

• Reinstall the 15 AMP fuse.

• Reinstall service disconnect.

• Attempt to start the generator from the AOM switch by selecting **MANUAL**.

• Set "Set Exercise" switch (Page 14).

Test 4: — Check The Starter Motor

Whenever the unit is directed to start (MANUAL or AUTO), the CMA delivers approximately12VDC from **Pin #2, Wire #56** to the starter contactor for about 15 seconds and repeats the attempt until around 90 seconds of start time have accumulated. During the starting attempt, the CMA monitors **Pin #8, Wire #66A** and **Pin #7, Wire #0** for a minimum frequency signal. This frequency terminates the delivery of start voltage to the starter contactor. If the minimum frequency signal has not been sensed after about 90 accumulative seconds of start time, the CMA terminates the engine starting cycle.

Troubleshooting Procedure:

• Reset the fault detection system by selecting **OFF** at the AUTO/OFF/MANUAL switch for 30+ seconds.

• Set the generator circuit breaker to the **OFF** position.

Select the **MANUAL** position at the AUTO/OFF/MANUAL switch and *while* the start cycle is in progress:

• Measure for voltage at the terminal of the starter motor **Wire #16** , as shown in figure 27.

Figure 27 — Measure Starting Voltage

9-14VDC should be measured.

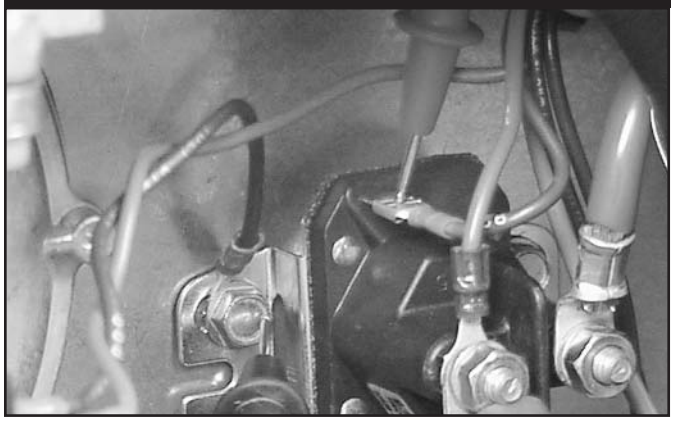
NOTE: Remember that the CMA only delivers about 12VDC to the starter contactor for 15 seconds and then rests for 15 seconds.

•• If no voltage is present at the terminal of the starter motor:

Test 5: — Check Starter Contactor

- Check for voltage at **Wire #56** at the starter contactor as shown in figure 28.

Figure 28 — Measuring Coil Terminals of Starter Contactor



•• If intermittent voltage is present at **Wire #56** at the starter contactor with no voltage at the terminal connecting **Wire #16**:

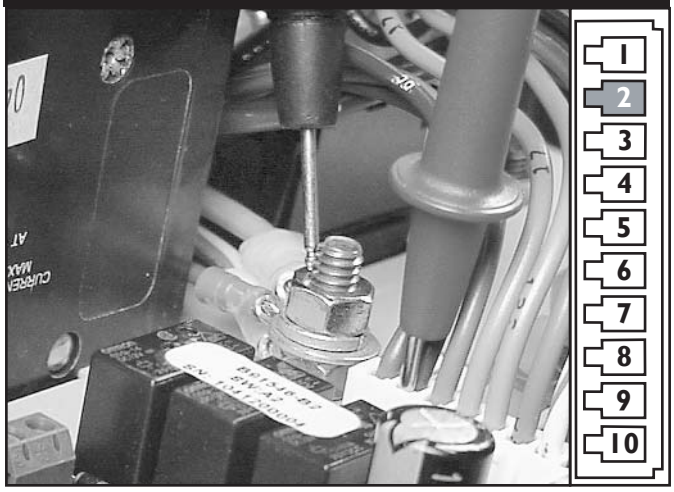
- Replace the starter contactor.

•• If no voltage presents itself at **Wire # 56:**

Test 6: — Check CMA Board

- Measure the voltage at **Pin #2, Wire #56** to ground as shown in figure 29.

Figure 29 — Measuring Pin #2, Wire #56 And Ground



About 9-14VDC should be measured while cranking.

•• If no voltage is measured:

Verify that there are no other faults BEFORE replacing the CMA circuit board.

- Replace the CMA circuit board.

•• If voltages are present but the starter won't engage:

- Check the NEGATIVE (-) cable for good contact. Repair or replace any defects with the grounding cable.

•• If starting voltage is present at the starter terminal and you determine that all grounds are good:

- Refer to the BRIGGS & STRATTON Service Manual **(# 272147)** for procedures to check the engine starter.

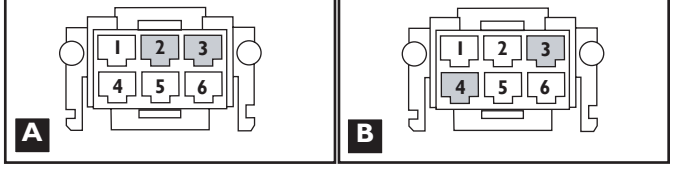
Test 7: — Engine Failure

Refer to the BRIGGS & STRATTON Service Manual **(# 272147)** for procedures to check the engine.

Checking Power Winding Through the P1 Connector

There are two seperate windings that make up the power output of the stator used in the Home Standby Generator System. They share a common connection at pin 3 of the P1 connector. To check the power windings through the P1 connector, refer to figure 30 and follow the procedure outlined below:

Figure 30 — Measure Power Windings



With an appropriate volt-ohm-meter (BRIGGS & STRATTON multimeter **# 19464)**;

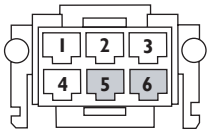
- Measure the resistance value between pin 2 and pin 3 at the P1 connector (Figure 30A).
- Measure the resistance value between pin 3 and pin 4 at the P1 connector (Figure 30B).
- Compare the values with the stator resistance chart on page 32.

Checking the Battery Charge Winding (BCW) Through The P1 Connector

With an appropriate volt-ohm-meter (BRIGGS & STRATTON multimeter **# 19464)**;

- Measure the resistance value between pin 5 and pin 6 at the P1 connector (Figure 31).

Figure 31 — Measure Battery Winding (BCW)



- Compare the values with the stator resistance chart listed at right.

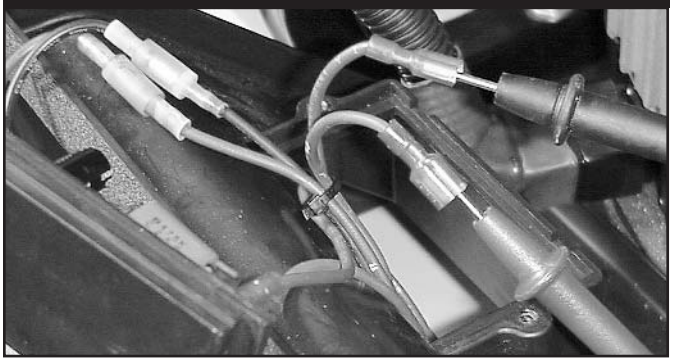
Checking Excitation Winding (DPE) at the Voltage Regulator

- Remove the two screws that secure the voltage regulator to the airduct.
- Remove **Wire #2** (Blue) and **Wire #6** (Red) from the voltage regulator.

With an appropriate volt-ohm-meter (BRIGGS & STRATTON multimeter **# 19464)**;

- Insert one lead into the spade connector of each wire (Figure 32).

Figure 32 — Measure Excitation Winding (DPE)



- Compare the values with the stator resistance chart listed at right.

Checking Rotor Winding

NOTE: It is necessary to remove the stator from the engine adaptor in order to measure the rotor winding.

With an appropriate volt-ohm-meter (BRIGGS & STRATTON multimeter **# 19464)**;

- Touch one lead to each slip ring.
- Compare the values with the rotor resistance chart listed below.

Stator Resistance

Part No.	Power	DPE	BCW
193091AGS	.20 - .26	2.06 - 2.5	.16 - .21

Rotor Resistance

Model	Unit	Part No.	Ohms
1897-1976-1977	7kW	192171GS	7.5 - 9.3

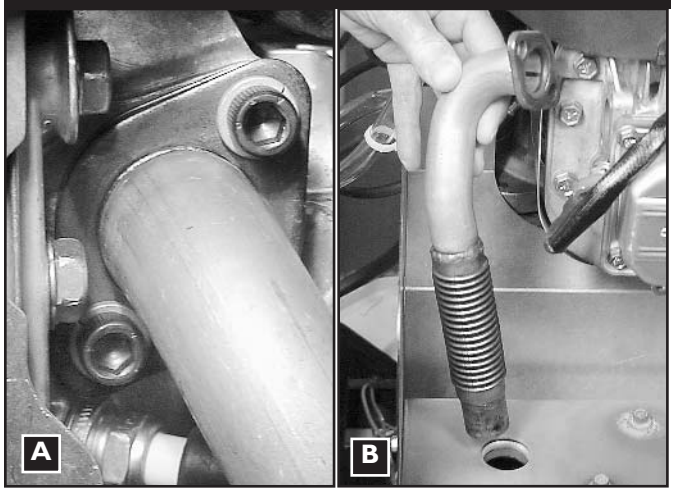
GENERATOR UNIT DISASSEMBLY

Preparation

At this point, it is assumed that you already have the roof, the left side panel and the front enclosure panel removed. See page 9 for information relating to removing these components.

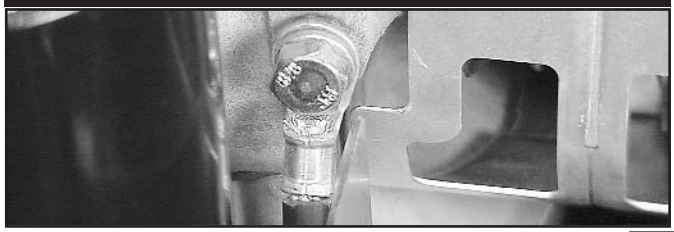
1. Drain engine oil (Page 15).
2. AOM switch — **OFF**.
3. Main Circuit Breaker — **OFF.**
4. 15 AMP fuse — **OUT.**
5. Remove the two (6mm) bolts that hold the exhaust tube to the engine (Figure 33A).
6. Slip the flexible exhaust manifold up and out of the muffer assembly (Figure 33B).

Figure 33 — Removing the Exhaust Flex Tube



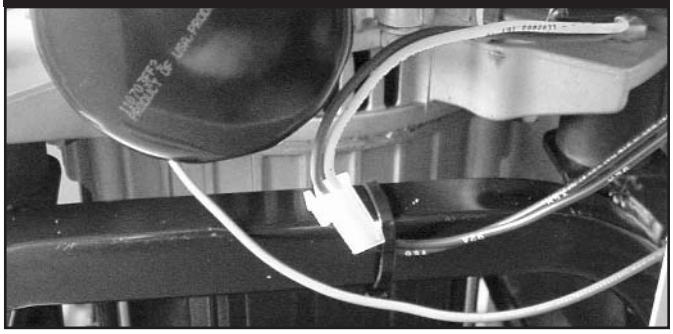
7. Remove the two bolts that secure the muffler heat shield assembly and set the heat shield aside.
8. Using a 10mm wrench, disconnect the negative (-) battery cable from the battery and secure in such a way as not to allow it to come in contact with the terminal.
9. Disconnect the other end of the (-) negative cable from the engine block (Figure 34).

Figure 34 — Negative (-) Battery Cable at Engine Block



10. Remove the positive (+) battery cable from the starter.
11. Disconnect the 6-pin connector (P-1) from the generator.
12. Disconnect the wire from the oil pressure sensor.
13. Disconnect the wire from the oil warmer (if so equipped) and from the harness connector (Figure 35).

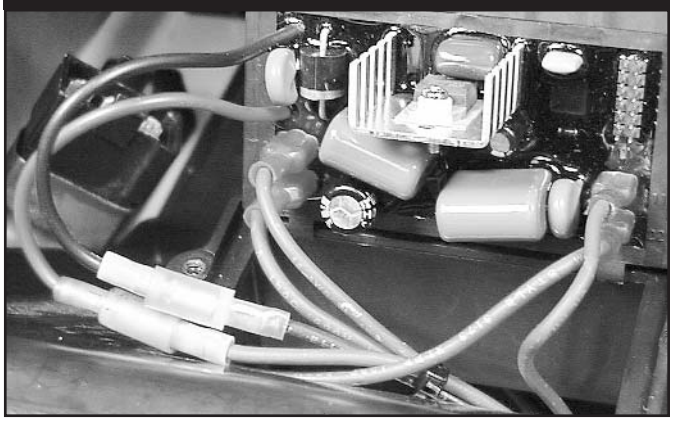
Figure 35 — Disconnect The Oil Temperature Connector



14. Remove the lower engine mount nuts from all four engine mounts.
15. Disconnect the fuel supply hose at the mixer and plug hose.
16. Remove the voltage regulator mounting screws.

NOTE: Carefully note the location of the wires that are connected to the voltage regulator (Figure 36) and remove wires from regulator.

Figure 36 — Voltage Regulator Wiring



17. Push the wire harness for the regulator through the channel in the air duct into the center of the air plenum.

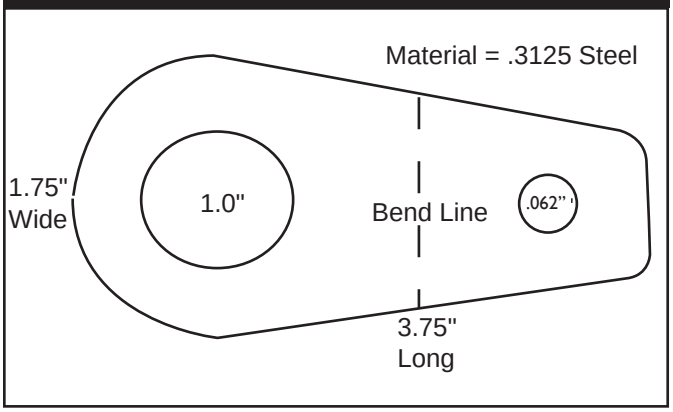
Engine/Alternator Removal

Fabricating Lifting Hardware

Depending on the type of lifting mechanism you have available, it may be necessary to fabricate a pair of lifting eyes to remove the engine/alternator assembly from the mounting cradle.

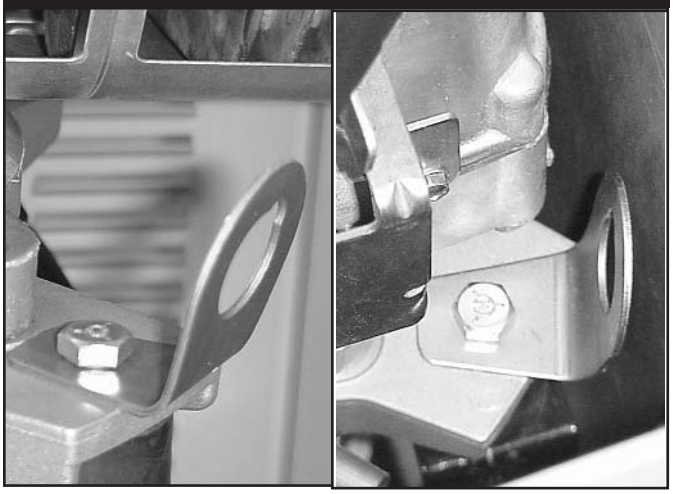
If this is the case, fabricate two lifting eyes according to the following specifications (Figure 37):

Figure 37 — Lifting Eye Specifications



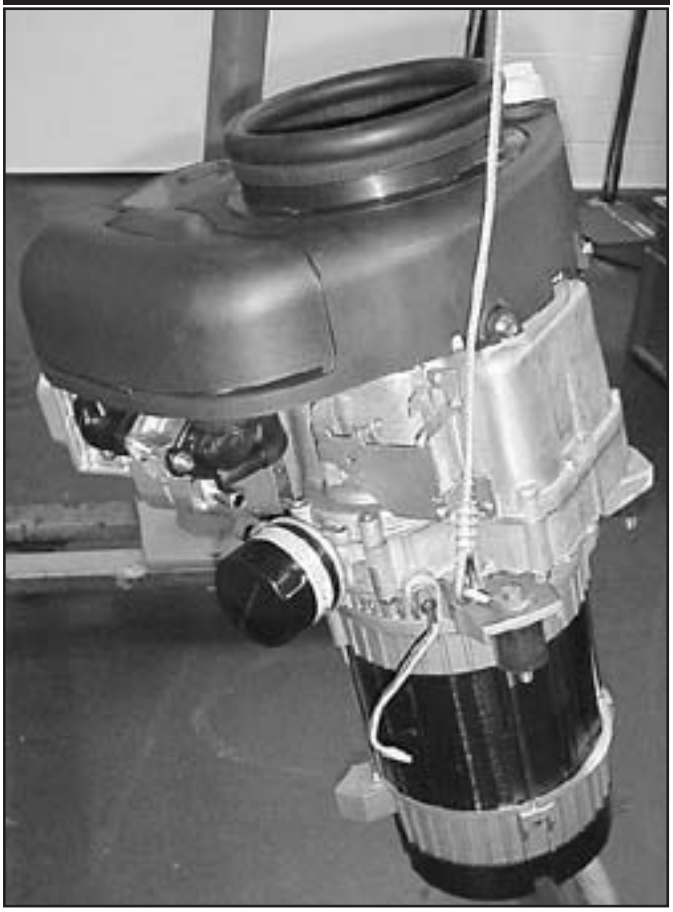
1. Remove the nut from the upper portion of the engine mount that is located forward of the engine starter as shown in figure 38.

Figure 38 — Lifting Eyes Installed



2. Install fabricated mounting brackets.
3. Repeat this process for the engine mount that is located behind the oil filter.
4. Carefully lift the engine/generator assembly until it is clear of the cradle (Figure 39).

Figure 39 — Engine/Alternator Assembly Suspended



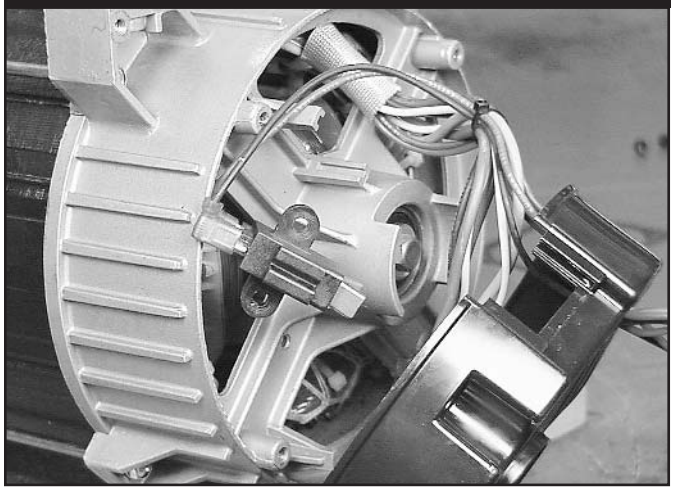
NOTE: For shop work it is a good idea to have an extra engine cradle available.

Removing Brushes

The brush assembly is located inside the rear bearing assembly.

1. Set the stator assembly on the table with the 6-pin connector up.
2. Remove the plastic end cover and remove the two mounting bolts that secure the brush holder to the rear bearing carrier (Figure 40).

Figure 40 — Removing End Cover & Brush Holder Assembly

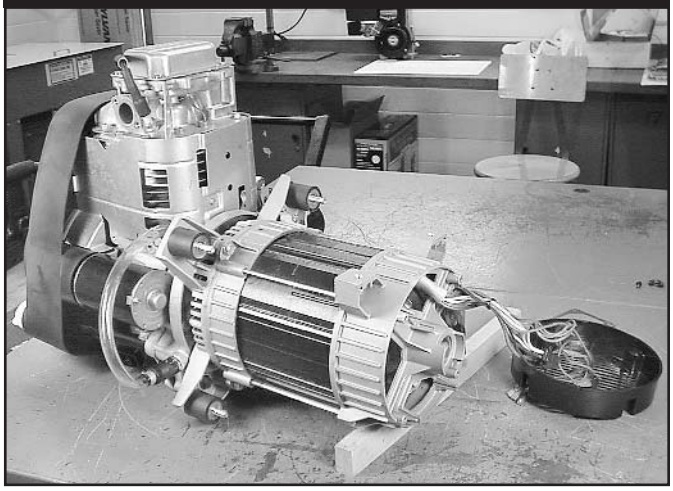


Removing The Alternator

1. Make sure the engine/alternator assembly is set on a sturdy flat work surface (Figure 41).

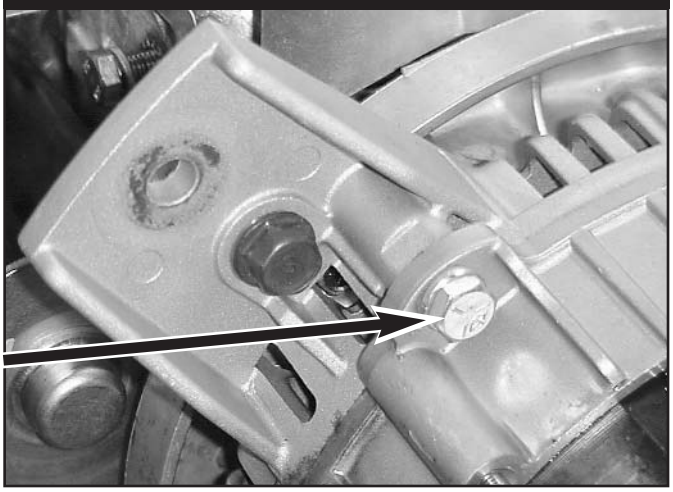
CAUTION: Do not set the generator assembly on the plastic end cap or damage will occur..

Figure 41 — Prepairing To Remove The Alternator



2. Locate the bolts that attach the generator assembly to the engine adaptor (Figure 42).

Figure 42 — Alternator Mount Bolts



3. Remove all four bolts.
4. Remove the stator assembly.

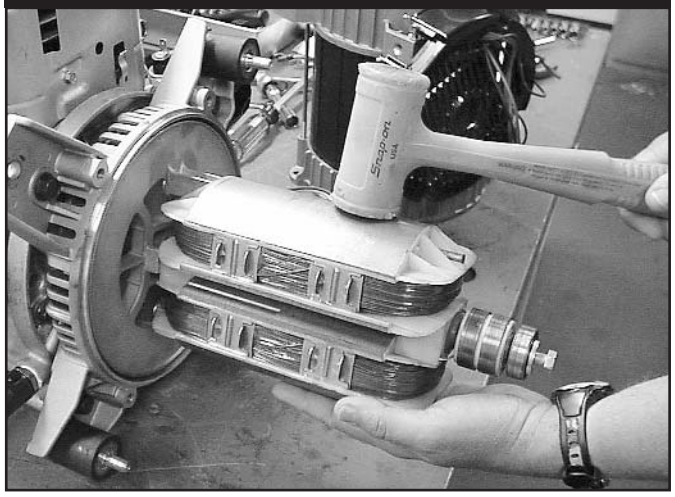
Removing The Rotor

1. Remove the rotor through-bolt.

NOTE: The rotor is mounted on a tappered engine shaft and sometimes sticks to the engine shaft. As an added safety precaution, turn the through-bolt into the threads of the engine shaft by hand to prevent the rotor from falling.

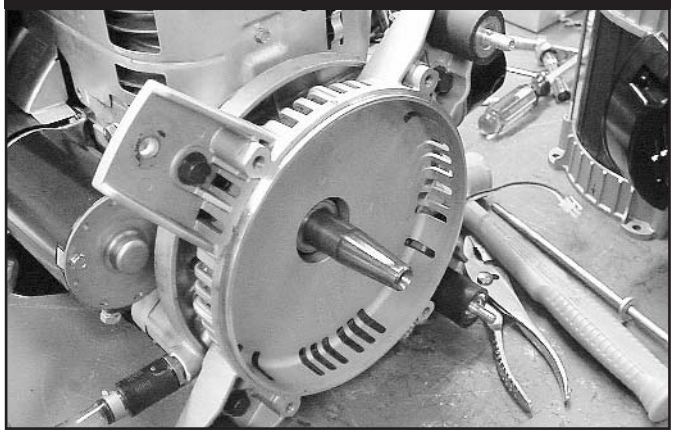
2. While supporting and pulling the rotor with one hand, tap the rotor assembly with a soft mallet until it comes free of the engine shaft (Figure 43).

Figure 43 — Removing The Rotor



Unless there are special circumstances, there is no reason to remove the engine adaptor (Figure 44) from the engine.

Figure 44 — Engine Adaptor



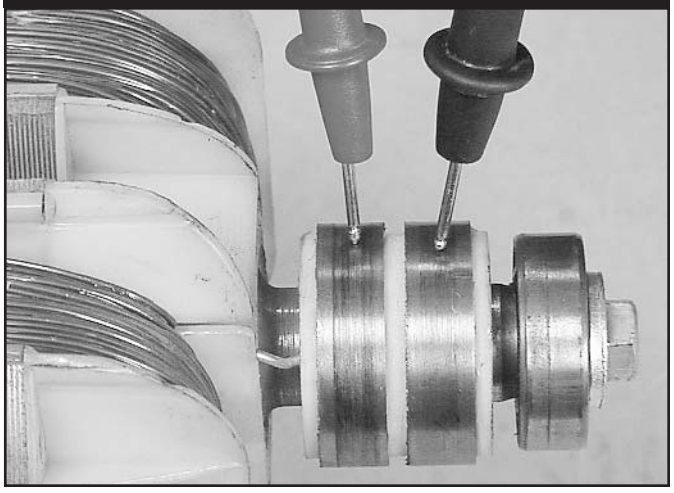
Inspecting The Rotor Assembly

It is not possible to check the serviceable condition of a rotor assembly without de-soldering the diode and capacitor.

NOTE: To ensure an accurate reading, it may be necessary to clean the slip rings with "Scotch Brite" or fine emmery cloth.

The reading that is obtained by the process shown in figure 45 only gives the resistance value of the rotor winding.

Figure 45 — Rotor Assembly



It does not show if the diode or the thermal protection device is serviceable. The only way to determine if these components are serviceable, is to de-solder them from the electrical circuit of the rotor assembly and check them individually.

For this reason, rotor replacement should only be considered when all other possible faults have been eliminated.

CAUTION: In order to prevent damaging the brushes, assemble the stator to the engine adaptor first. Then install the brush holder assembly.

NOTES